The Impact of

Heart Disease and Stroke

In Utah

2007

HEART DISEASE & STROKE PREVENTION PROGRAM
UTAH DEPARTMENT OF HEALTH

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The following individuals assisted with the development and review of this report:

Utah Department of Health

Amy Bowler, BA	Bureau of Health Promotion
Emily C. Carlson, BS, CHES	Heart Disease and Stroke Prevention Program
Karen Coats, BS, CHES	Heart Disease and Stroke Prevention Program
Keely M. W. Cofrin, PhD	Office of Health Care Statistics
Pamela A. Clarkson Freeman, PhD	Office of Health Care Statistics
Michael Friedrichs, MStat	Bureau of Health Promotion
Brooke A. Gardner, BS	Heart Disease and Stroke Prevention Program
Barbara A. Larsen, MPH, RD	Heart Disease and Stroke Prevention Program
Karen Nellist, MPH	Bureau of Health Promotion
Brenda Ralls, PhD	Diabetes Prevention and Control Program
Jessie Shupe, BA	Heart Disease and Stroke Prevention Program
Shelly Wagstaff	Bureau of Health Promotion
B. Ned Wilde, BS	Heart Disease and Stroke Prevention Program
Don J. Wood, MD	Bureau of Emergency Medical Services

External Partners:

Dorothy Gohdes, MD	Consultant
Lisa M. Petot, BS	Molina Healthcare of Utah
Matt Snell, MPH	Select Health
Joan Ware, MSPH, RN	National Association of Chronic Disease Directors

Executive Summary

Cardiovascular disease (CVD) is the leading cause of death for both men and women in Utah and in the U.S. Cardiovascular disease encompasses a broad spectrum of diseases including coronary heart disease, hypertensive diseases, cerebrovascular disease (stroke) and other diseases of the heart and peripheral vascular system.

Each year CVD claims the lives of more than 4,000 Utah residents. Nearly one third (29.2%) of all deaths are CVD-related. About 15 percent of all CVD deaths occur in those under age 65. Although the majority of the burden lies among those over age 65, the proportion of deaths that occur among those under age 65 has gone up 2.4 percent in the past 10 years. Most CVD deaths are from coronary heart disease. Coronary heart disease accounted for roughly 40 percent of all CVD-related deaths and 12 percent of all deaths in 2005.

Men have higher CVD mortality rates when compared to women. The age-adjusted mortality rate from CVD in 2005 in Utah was 235.2 per 100,000 for men and 209.8 per 100,000 for women. Other at-risk groups, according to national data, include ethnic groups such as Blacks, Hispanics, and American Indians. Those living in frontier areas also have higher mortality rates when compared to those living in urban and rural areas.

Mortality is only part of the burden of CVD. In 2005 more than 20,000 people in Utah (1 in 100) were hospitalized with CVD-related illnesses. This represents a huge cost to the individuals and the State. In 2006, the estimated direct and indirect costs of CVD in the U.S. were over $400 billion. Hospitalization charges alone in Utah were over $500 million in 2005, and two-thirds of those charges were paid for with government funds. Despite declines in hospitalization rates, the number of hospitalizations per year increased by almost 2,000 between 1996 and 2005.

Cardiovascular disease is not only the leading cause of death, it is also one of the leading causes of disability. Between 2001 and 2005, around half of adults who had experienced a stroke, heart attack, or had coronary heart disease reported being limited in their activities compared to less than 20 percent of the remaining adult population in Utah. More than fifteen percent of persons who have had a stroke, heart attack, or coronary heart disease reported at least seven days of poor mental health in the past month. Less than 30 percent of those who had a heart attack between 2001 and 2005 attended cardiac rehabilitation, and only 16 percent of those who had a stroke attended a formal rehabilitation program. Such programs help people develop skills to compensate for disabilities that might result from a cardiovascular event.

There are multiple important risk factors which contribute to CVD, many of which are modifiable. These include high blood pressure, high blood cholesterol, cigarette smoking, diabetes, poor physical activity levels, and being overweight or obese. Between 2001 and 2005, more than three-quarters of Utah adults reported having at least one risk factor for CVD, and an alarming 46.8 percent had two or more risk factors. Overweight/obesity is the most prevalent risk factor among adults. In 2005, 58.2 percent of adults in Utah reported being overweight/obese. Smoking is the only risk factor in Utah that has decreased in recent years. Rates for adults with high blood pressure or who don't get the recommended amount of physical activity remained unchanged. The percent of adults who have high blood cholesterol, diabetes or who are overweight or obese have all risen in the past 10 years.

Despite the decline in mortality from CVD, much work remains to be done to reduce the incidence of cardiovascular events. Efforts to reduce morbidity and mortality from CVD need to address the disparities that exist as well as the increasing prevalence of risk factors among Utahns. This report presents valuable data to help health professionals and policy makers design interventions to reduce the burden of CVD in Utah.

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Map of Utah - Population Density

Population density was calculated at the county level by dividing the total mid-year population in 2003 for a given county by the total land area for the same county. The population density was six or fewer persons per square mile for frontier counties, greater than six but less than 100 persons per square mile for rural counties, and 100 or more persons per square mile for urban counties.

Frontier counties - Beaver, Daggett, Duchesne, Emery, Garfield, Grand, Juab, Kane, Millard, Piute, Rich, San Juan, Uintah, Wayne

Rural counties - Box Elder, Cache, Carbon, Iron, Morgan, Sanpete, Sevier, Summit, Tooele, Wasatch, Washington

Urban counties - Davis, Salt Lake, Utah, Weber

Introduction

Cardiovascular disease is a complex and diverse set of chronic conditions resulting from the interaction of multiple risk factors. The public health burden of cardiovascular disease is largely atherosclerotic disease, sometimes referred to as hardening of the arteries. In atherosclerosis, plaque builds up in arteries compromising blood supply to vital tissues of the heart and brain. If a clot forms at the site of plaque buildup in one of these arteries, it can trigger an acute heart attack or stroke depending on the location of the clot. Both acute heart attack and stroke victims require prompt medical treatment to restore blood flow to the tissue in order to limit heart or brain damage. Delay in seeking treatment can result in serious disability or death. Public awareness of the signs and symptoms of heart attack and stroke and the need to call 9-1-1 immediately have become a recent focus of media campaigns and other efforts to educate the public on the importance of early intervention.[1,2]

A number of risk factors contribute to atherosclerosis. Risk factors such as age, family history and gender cannot be changed. Other modifiable risk factors include high blood pressure, high blood cholesterol levels, smoking, physical inactivity, and being overweight. Diabetes also puts individuals at risk for cardiovascular disease. Persons with diabetes have the same high risk for heart attack as persons who have had a previous heart attack.

Key to decreasing the incidence and prevalence of cardiovascular disease are individual and public health efforts to reduce risk factors in order to prevent life threatening events.[1,2] Public health interventions seek to improve the quality of life, extend overall survival, and reduce the incidence of subsequent events by establishing partnerships with local, state, and federal agencies, and others within the community. By assessing and monitoring the cardiovascular health of the population and identifying sub-populations at risk, cardiovascular health policies can be established to ensure access to high quality primary and secondary prevention services. The information contained in this document can assist everyone in the broad public health effort to control cardiovascular disease, the leading cause of death in Utah.

Cardiovascular Disease: The Leading Cause of Death in Utah

In 2005, cardiovascular disease killed 3,891 Utahns, more than the next three leading causes of death combined. Cardiovascular disease, which includes diseases of the heart and cerebrovascular diseases, accounted for 29.2% of all Utah resident deaths during the same year.

Figure 1.0   Leading Causes of Death in Utah, 2005
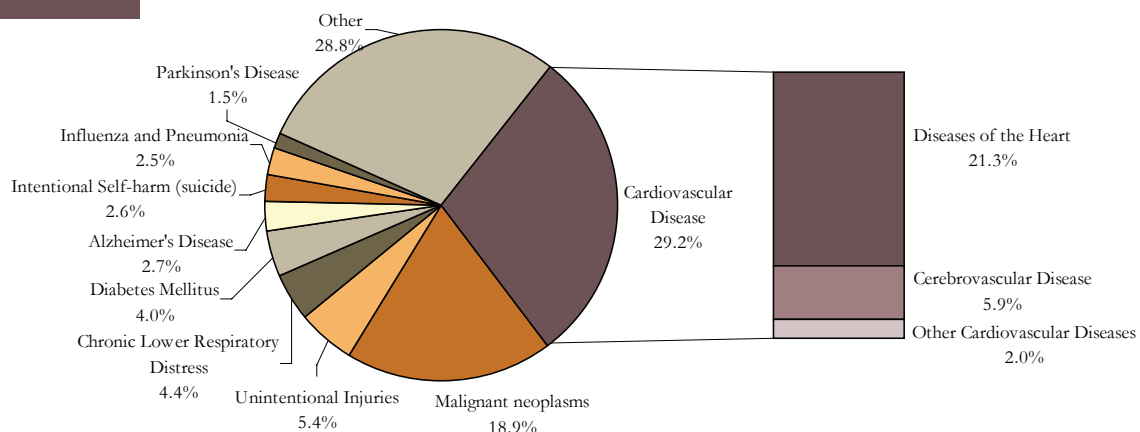
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health;
ICD codes taken from NCHS 50 leading causes of death

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Chapter One
Mortality

Cardiovascular Disease Mortality

What is cardiovascular disease?

Cardiovascular disease (CVD) includes a variety of diseases of the heart and blood vessels. These include coronary heart disease, stroke, hypertensive diseases, rheumatic heart disease, heart failure, and other conditions.

Why is it important?

Cardiovascular disease is the leading cause of death for both men and women in the U.S. and in Utah.[1] Heart disease and stroke, the most common forms of CVD, account for 40 percent of all deaths in the U.S. In 2006, the economic impact of heart disease and stroke was estimated to be over $400 billion nationally, a figure which includes health care expenditures, lost productivity, and disability.[1] The burden of CVD falls heavily on those over age 65 in Utah, with over 80 percent of CVD deaths occurring in this age group. (See Figure 1.1.)

Who is at risk?

Although elderly men are most commonly considered to be at highest risk of death from CVD, it is also the leading killer of women in the U.S. Black and Hispanic persons are at higher risk than White and non-Hispanic persons. Diabetes (a risk factor for CVD) has also increased the threat of CVD among Native American communities.[3] Individuals who smoke, have high blood pressure, high blood cholesterol, who are overweight or obese, have a family history of CVD, or who are physically inactive are also at increased risk for developing CVD. Persons who have had a heart attack or stroke are particularly at risk for recurrent events and death from CVD.

Figure 1.1 **Distribution of Cardiovascular Disease Deaths by Age Group, Utah, 2001-2005**
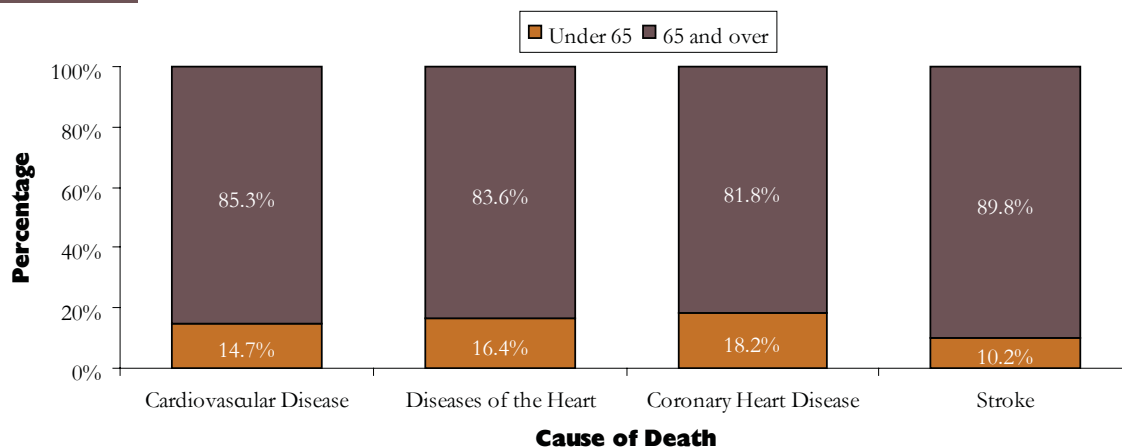
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes for: cardiovascular disease I00-I78, diseases of the heart I00-I09, I11, I13, I20-I51, coronary heart disease I11, I20-I25, stroke I60-I69

How big is the problem in Utah?

- In 2003, Utah had the 5th lowest age-adjusted CVD mortality rate of any state, with 250.5 deaths per 100,000. The U.S. mortality rate for CVD in 2003 was 306.1 deaths per 100,000.[4]

- Between 1996 and 2005, the state age-adjusted mortality rate for CVD decreased 22.7%, from 287.8 per 100,000 to 222.4 per 100,000.

Figure 1.2 **Cardiovascular Disease Mortality by Year and Gender, Utah and U.S., 1996-2005**

Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
1996-1998: ICD 9 codes 390-448; 1999-2005: ICD 10 codes I00-I78
Age-adjusted to 2000 U.S. standard population
Rates prior to 1999 multiplied by ratio of 0.9981 for comparability

- 85.3% of CVD deaths occurred among those age 65 and older. (see figure 1.1)

- CVD mortality rates increased with age, but decreased over time for all age groups.

- Persons age 65 to 74 had the largest relative decrease in mortality (39.1%), from 711.8 per 100,000 in 1996 to 433.8 per 100,000 in 2005.

Figure 1.3 **Cardiovascular Disease Mortality by Age, Utah Adults Age 55 and Over, 1996-2005**
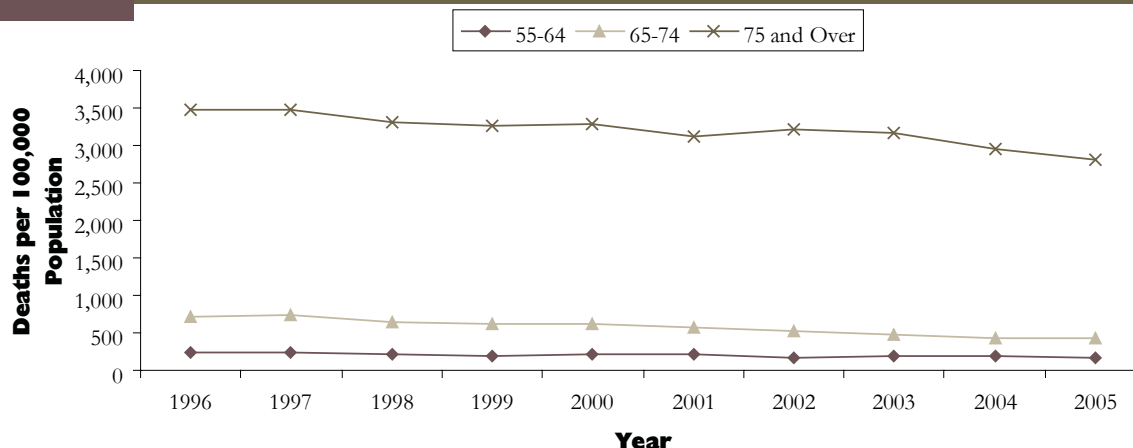
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
1996-1998: ICD 9 codes 390-448; 1999-2005: ICD 10 codes I00-I78
Rates prior to 1999 multiplied by ratio of 0.9981 for comparability

Figure 1.4 **Cardiovascular Disease Mortality by Race/Ethnicity, Utah, 2001-2005**
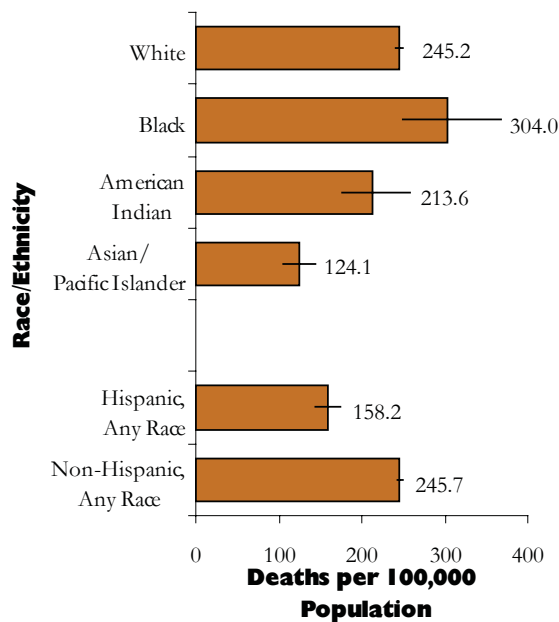
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I00-I78
Age-adjusted to 2000 U.S. standard population

- Blacks had the highest age-adjusted mortality rate (304.0 deaths per 100,000) when compared to all other races.

- Frontier areas had a higher mortality rate for CVD than urban and rural areas. Rural areas had a lower rate than urban areas.

Figure 1.5 **Cardiovascular Disease Mortality by Geographic Area, Utah, 2001-2005**

Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I00-I78
Age-adjusted to 2000 U.S. standard population

Table 1.6   **Cardiovascular Disease Mortality by Demographic Characteristic, Utah, 2001-2005**

	Utah Population		Cardiovascular Disease Mortality					
	Distribution	Number of Persons	Age-adjusted Rate[1]	95% CI	Crude Rate[1]	95% CI	Number of Deaths[2]	Distribution of Deaths
All Utahns	100%	2,413,618	243.1	(239.7 - 246.5)	167.5	(165.2 - 169.9)	4,040	100.0%
Gender								
Male	50.3%	1,215,077	260.6	(255.3 - 265.9)	158.1	(154.9 - 161.2)	1,920	47.5%
Female	49.7%	1,198,541	226.6	(222.3 - 231)	177.2	(173.8 - 180.6)	2,120	52.5%
Age Group								
0-54	84.6%	2,041,335			13.9	(13.2 - 14.6)	280	6.9%
55-64	7.0%	169,033			183.3	(174.4 - 192.6)	310	7.7%
65-74	4.4%	107,232			488.5	(469.9 - 507.2)	520	12.9%
75 and Over	4.0%	96,018			3,046.6	(2998.0 - 3095.2)	2,930	72.5%
Race Alone								
White	93.9%	2,265,525	245.2	(241.8 - 248.6)	176.8	(174.4 - 179.3)	4,010	97.6%
Black	0.9%	22,405	304.0	(248.7 - 368.1)	113.4	(95.0 - 135.3)	30	0.7%
American Indian	1.4%	32,904	213.6	(175.3 - 257.8)	83.7	(70.6 - 99.2)	30	0.7%
Asian/Pacific Islander	2.6%	61,574	124.1	(106.3 - 144)	62.6	(54.2 - 72.2)	40	1.0%
Ethnicity								
Hispanic	10.3%	248,069	158.2	(242.3 - 249.2)	43.4	(181.6 - 186.8)	110	2.7%
Non-Hispanic	89.7%	2,165,549	245.7	(143.6 - 173.8)	184.2	(39.9 - 47.3)	3,990	97.3%
Geographic Area								
Frontier	4.9%	119,278	260.8	(247.2 - 274.9)	232.4	(220.2 - 244.6)	280	6.9%
Rural	19.2%	462,669	230.2	(223.5 - 237.1)	191.7	(186.1 - 197.3)	890	22.0%
Urban	75.9%	1,831,671	245.7	(241.7 - 249.8)	157.2	(154.7 - 159.8)	2,880	71.1%

1 Rate per 100,000 population

2 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; race/ethnicity data derived using percentage of total population from 2003 Census Bureau Estimates; mortality data from Utah Death Certificate Database, Office of Vital Records, Utah Department of Health

ICD 10 codes I00-I78

Heart Disease and Coronary Heart Disease Mortality

What is heart disease?

Heart disease is a general term that describes many different diseases including coronary heart disease, rheumatic heart disease, hypertension, heart failure and other heart conditions. The most common form of heart disease is coronary heart disease, also known as coronary artery disease. Coronary heart disease is the largest contributor to death from heart disease.

Coronary heart disease is a condition in which blood flow to the heart is reduced. When the coronary arteries become narrowed or clogged, an inadequate amount of blood oxygen reaches the heart tissue. The part of the heart not receiving oxygen begins to die, and some of the heart muscle may be permanently damaged. Coronary heart disease can cause angina (chest pain), myocardial infarction (heart attack), and sudden cardiac death. Heart failure can also be a significant cause of death. Heart failure occurs when the heart muscle is damaged and can no longer pump blood efficiently due to hypertension, diabetes, or heart attack.[2]

Why is it important?

Heart disease accounts for about three quarters of all cardiovascular mortality in the U.S.[5] Coronary heart disease is the single largest killer of men and women in the U.S. and Utah, but other types of heart disease, including rheumatic heart disease and heart failure, can also be fatal. In the U.S., the estimated direct and indirect cost of heart failure alone was $29.6 billion in 2006.[5] From 1993–2003, the number of heart failure deaths increased 20.5 percent nationally.[6]

Who is at risk?

Persons over 65 years of age are at high risk of death from coronary heart disease. Over 83 percent of men and women who die of coronary heart disease are over 65 years of age.[5] Disparate groups such as Blacks and American Indians are at high risk for coronary heart disease mortality. Prompt treatment for coronary heart disease is very important. Nearly half of all cardiac deaths in the U.S. occur before patients reach the hospital.[7]

Mortality from heart failure is also very high for those with the condition. Hypertension and diabetes are often associated with heart failure. Mortality from heart failure is higher in men than women.[5]

Figure 1.7 **Distribution of Heart Disease Deaths, Utah, 2005**
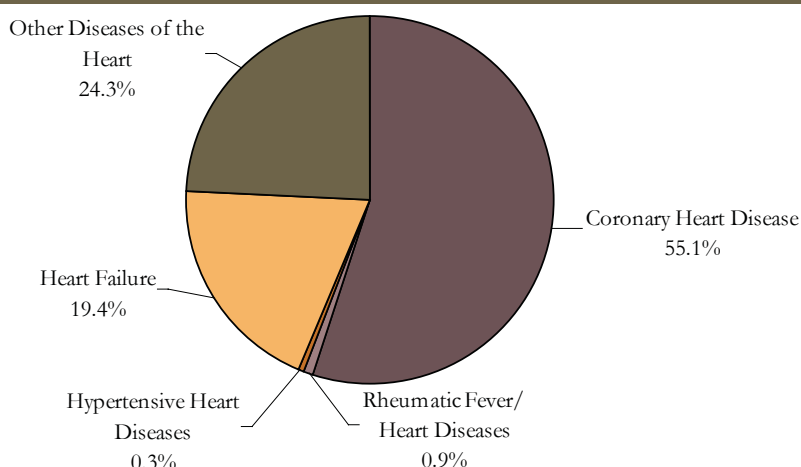
Other Diseases of the Heart 24.3%
Coronary Heart Disease 55.1%
Heart Failure 19.4%
Hypertensive Heart Diseases 0.3%
Rheumatic Fever/ Heart Diseases 0.9%

Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes CHD I11, I20-I25; Rheumatic Fever/HD I00-I09; Hypertensive HD I13; HF I50; Other I26-I49, I51;

How big is the problem in Utah?

Heart Disease

- Heart disease is the leading cause of death in Utah and in the U.S. for both men and women.

- In 2003, Utah had the 6th lowest age-adjusted mortality rate of any state for heart disease, with 179.9 deaths per 100,000. The same year the U.S. mortality rate for heart disease was 232.3 deaths per 100,000.[4]

- The state age-adjusted mortality rate for heart disease decreased 20.3% from 203.5 deaths per 100,000 in 1996 to 162.1 deaths per 100,000 in 2005.

- Age-adjusted mortality rates for heart disease were higher for males every year from 1996-2005.

Figure 1.8 **Heart Disease Mortality by Year and Gender, Utah and U.S., 1996-2005**
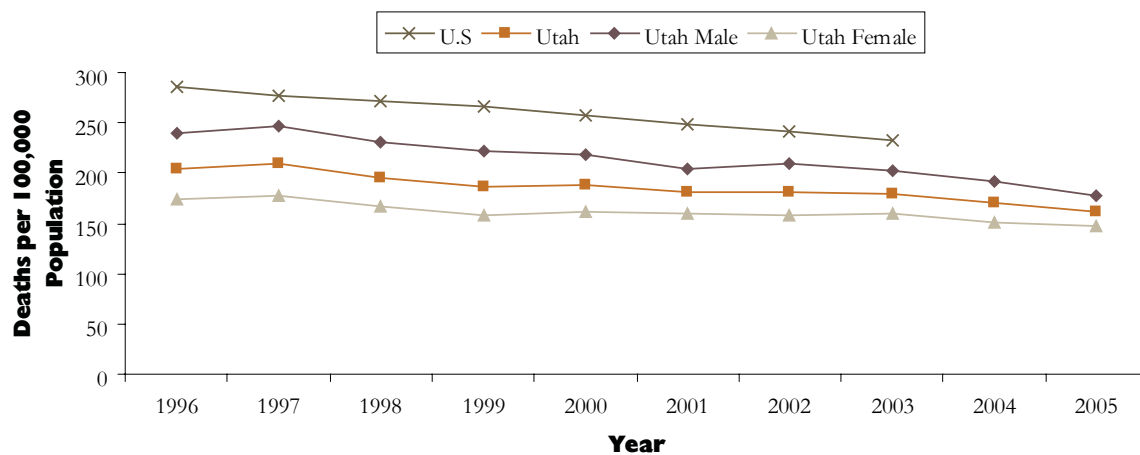
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
1996-1998: ICD 9 codes 390-398, 402, 404, 410-429; 1999-2005: ICD 10 codes I00-I09, I11, I13, I20-I51
Age-adjusted to 2000 U.S. standard population
Rates prior to 1999 multiplied by ratio of 0.9858 for comparability

Figure 1.9 **Heart Disease Mortality by Geographic Area, Utah, 2001-2005**
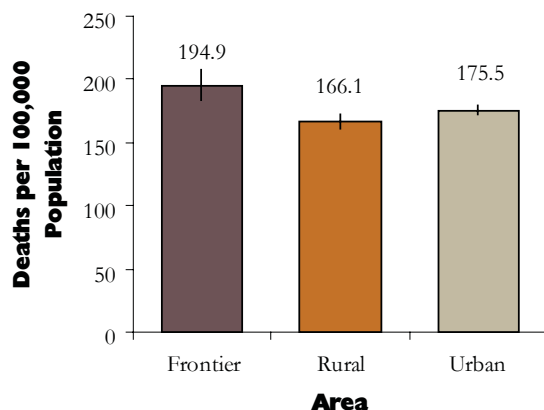
- Utahns residing in frontier areas had a higher heart disease mortality rate (194.9 per 100,000) than those residing in urban (175.5 per 100,000) and rural areas (166.1 per 100,000).

Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I00-I09, I11, I13, I20-I51
Age-adjusted to 2000 U.S. standard population

Figure 1.10 **Heart Disease Mortality by Age, Utah Adults Age 55 and Over, 1996-2005**

Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
1996-1998: ICD 9 codes 390-398, 402, 404, 410-429; 1999-2005: ICD 10 codes I00-I09, I11, I13, I20-I51
Rates prior to 1999 multiplied by ratio of 0.9858 for comparability

- Overall, the mortality rates for each age group decreased over time. The mortality rate for ages 65 to 74 saw the largest relative decrease from 536.1 deaths per 100,000 in 1996 to 306.4 deaths per 100,000 in 2005.

- In Utah, Blacks had the highest age-adjusted mortality rates for heart disease compared to all other races with 226.8 deaths per 100,000.
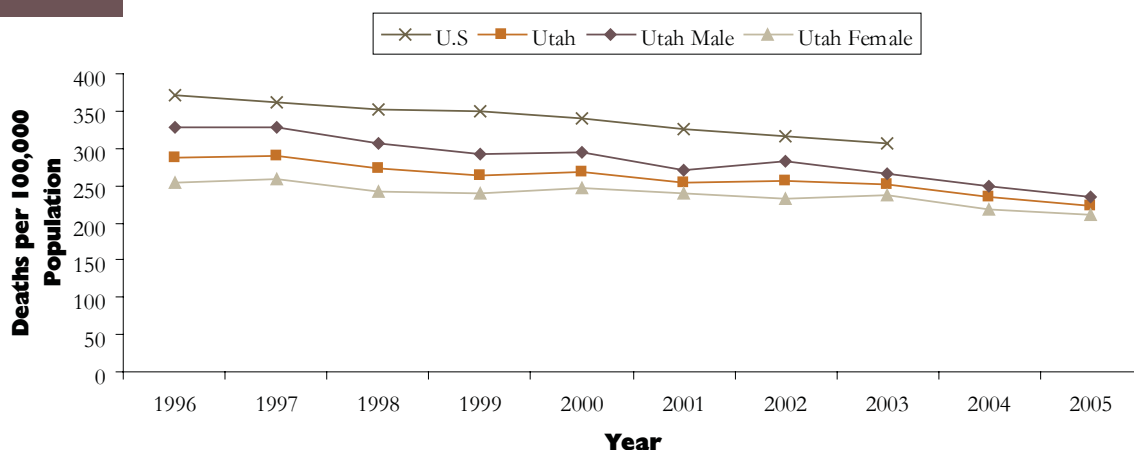
Figure 1.11 **Heart Disease Mortality by Race/Ethnicity, Utah, 2001-2005**
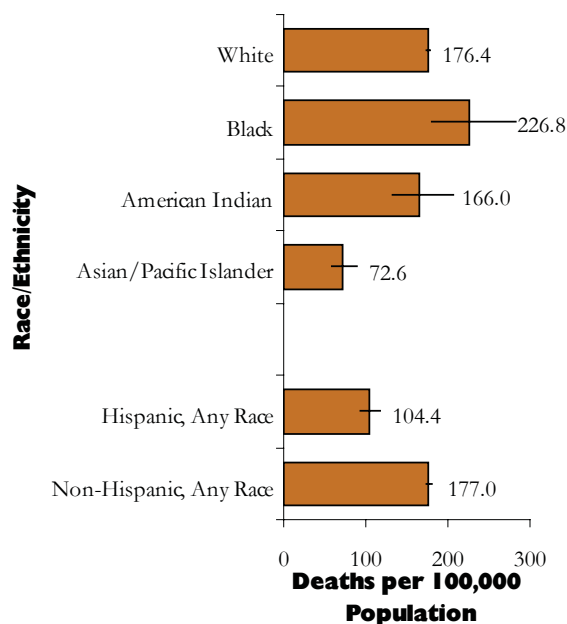
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I00-I09, I11, I13, I20-I51
Age-adjusted to 2000 U.S. standard population

Table 1.12 **Heart Disease Mortality by Demographic Characteristic, Utah, 2001-2005**

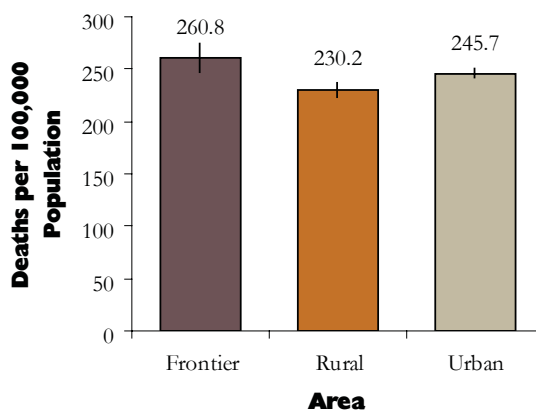|	Utah Population		Heart Disease Mortality					
	Distribution	Number of Persons	Age-adjusted Rate[1]	95% CI	Crude Rate[1]	95% CI	Number of Deaths[2]	Distribution of Deaths
All Utahns	100%	2,413,618	174.6	(171.7 - 177.4)	120.9	(119.0 - 122.9)	2,920	100.0%
Gender								
Male	50.3%	1,215,077	196.9	(192.3 - 201.5)	120.6	(117.8 - 123.3)	1,460	50.2%
Female	49.7%	1,198,541	155.1	(151.5 - 158.7)	121.3	(118.5 - 124.1)	1,450	49.8%
Age Group								
0-54	84.6%	2,041,335			11.3	(10.6 - 11.9)	230	7.8%
55-64	7.0%	169,033			146.1	(138.0 - 154.3)	250	8.5%
65-74	4.4%	107,232			359.7	(343.7 - 375.8)	390	13.3%
75 and Over	4.0%	96,018			2,140.4	(2,099.5 - 2,181.4)	2,060	70.3%
Race Alone								
White	93.9%	2,265,525	176.4	(173.5 - 179.3)	127.8	(125.7 - 129.9)	2,890	98.0%
Black	0.9%	22,405	226.8	(180.1 - 282.0)	88.9	(72.7 - 108.6)	20	0.7%
American Indian	1.4%	32,904	166.0	(132.0 - 206.0)	63.2	(52.0 - 77.0)	20	0.7%
Asian/Pacific Islander	2.6%	61,574	72.6	(59.2 - 88.1)	37.5	(31.2 - 45.2)	20	0.7%
Ethnicity								
Hispanic	10.3%	248,069	104.4	(92.7 - 117.2)	29.0	(26.1 - 32.2)	70	2.4%
Non-Hispanic	89.7%	2,165,549	177.0	(174.0 - 179.9)	133.2	(131.0 - 135.4)	2,880	97.6%
Geographic Area								
Frontier	4.9%	119,278	194.9	(183.2 - 207.1)	173.9	(163.4 - 184.5)	210	7.2%
Rural	19.2%	462,669	166.1	(160.4 - 172.0)	138.5	(133.7 - 143.3)	640	21.9%
Urban	75.9%	1,831,671	175.5	(172.1 - 178.9)	113.1	(110.9 - 115.2)	2,070	70.9%

1 Rate per 100,000 population

2 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; race/ethnicity data derived using percentage of total population from 2003 Census Bureau Estimates; mortality data from Utah Death Certificate Database, Office of Vital Records, Utah Department of Health

ICD 10 codes I00-I09, I11, I13, I20-I51

Coronary Heart Disease

- In 2003, Utah had the 3rd lowest age-adjusted mortality rate of any state for coronary heart disease with 101.8 per 100,000. That same year, the U.S. mortality rate for coronary heart disease was 172.4 per 100,000.[4]

- The age-adjusted mortality rate for coronary heart disease in Utah decreased 40.0%, from 147.1 per 100,000 in 1996 to 88.3 per 100,000 in 2005.

- In Utah, the age-adjusted mortality rate for males in 2005 was almost twice as high as the age-adjusted mortality rate for females. The rates were 112.3 per 100,000 for males and 67.8 per 100,000 for females.

Figure 1.13 Coronary Heart Disease Mortality by Year and Gender, Utah and U.S., 1996-2005
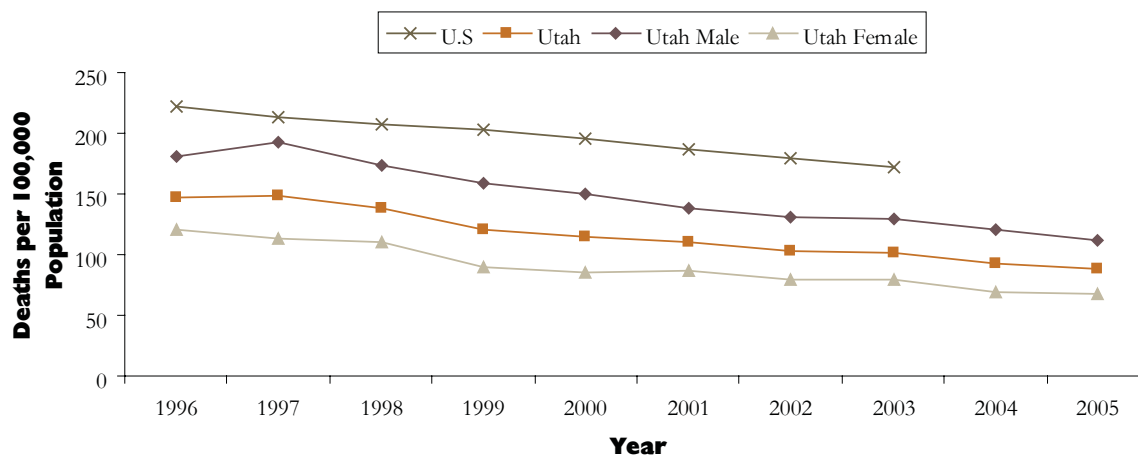
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
1996-1998: ICD 9 codes 402, 410-414, 429.2; 1999-2005: ICD 10 codes I11, I20-I25
Age-adjusted to 2000 U.S. standard population

Figure 1.14 **Coronary Heart Disease Mortality by Age, Utah Adults Age 55 and Over, 1996-2005**

Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
1996-1998: ICD 9 codes 402, 410-414, 429.2; 1999-2005: ICD 10 codes I11, I20-I25

- Mortality rates decreased over time for all age groups, with those age 65 to 74 seeing the largest relative decrease in mortality. The rate for this group decreased 55.5% from 427.9 per 100,000 in 1996 to 190.6 per 100,000 in 2005.

- Nearly 82% of coronary heart disease deaths occurred in those age 65 and older. (See Figure 1.1.)

- Blacks and American Indians had higher age-adjusted mortality rates for coronary heart disease when compared to all other races.

Figure 1.15 **Coronary Heart Disease Mortality by Race/Ethnicity, Utah, 2001-2005**
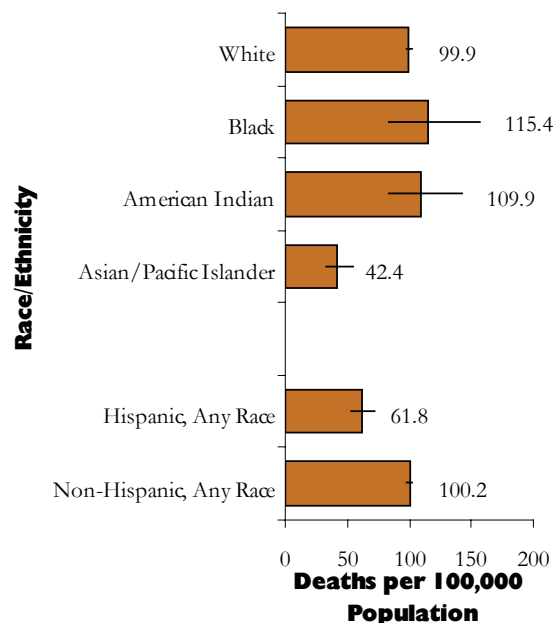
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I11, I20-I25
Age-adjusted to 2000 U.S. standard population

Figure 1.16   **Coronary Heart Disease Mortality by Geographic Area, Utah, 2001-2005**
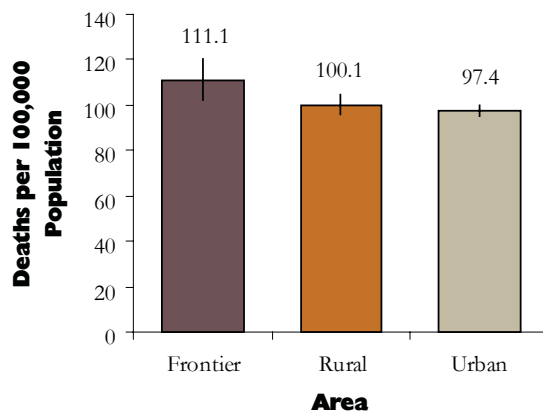
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I11, I20-I25
Age-adjusted to 2000 U.S. standard population

• Utahns residing in frontier areas had a higher coronary heart disease mortality rate (111.1 per 100,000) compared to those residing in urban (97.4 per 100,000) and rural areas (100.1 per 100,000).

Table 1.17   **Coronary Heart Disease Mortality by Demographic Characteristic, Utah, 2001-2005**

	Utah Population		Coronary Heart Disease Mortality					
	Distribution	Number of Persons	Age-adjusted Rate[1]	95% CI	Crude Rate[1]	95% CI	Number of Deaths[2]	Distribution of Deaths
All Utahns	100%	2,413,618	98.9	(96.8 - 101.1)	68.8	(67.3 - 70.3)	1,660	100.0%
Gender								
Male	50.3%	1,215,077	126.1	(122.5 - 129.8)	78.0	(75.8 - 80.2)	950	57.2%
Female	49.7%	1,198,541	76.3	(73.8 - 78.9)	59.5	(57.5 - 61.4)	710	42.8%
Age Group								
0-54	84.6%	2,041,335			6.5	(6.1 - 7.0)	130	7.8%
55-64	7.0%	169,033			99.6	(92.8 - 106.3)	170	10.2%
65-74	4.4%	107,232			232.1	(219.2 - 244.9)	250	15.1%
75 and Over	4.0%	96,018			1,156.0	(1,125.8 - 1,186.2)	1,110	66.9%
Race Alone								
White	93.9%	2,265,525	99.9	(97.7 - 102.1)	72.6	(71.1 - 74.2)	1,650	98.2%
Black	0.9%	22,405	115.4	(83.1 - 156.1)	46.3	(34.9 - 61.3)	10	0.6%
American Indian	1.4%	32,904	109.9	(82.8 - 143.1)	40.3	(31.4 - 51.6)	10	0.6%
Asian/Pacific Islander	2.6%	61,574	42.4	(32.5 - 54.3)	22.7	(17.9 - 28.9)	10	0.6%
Ethnicity								
Hispanic	10.3%	248,069	61.8	(52.9 - 71.8)	17.5	(15.3 - 20.0)	40	2.4%
Non-Hispanic	89.7%	2,165,549	100.2	(98.0 - 102.4)	75.7	(74.0 - 77.3)	1,640	97.6%
Geographic Area								
Frontier	4.9%	119,278	111.1	(102.3 - 120.4)	99.7	(91.7 - 107.7)	120	7.2%
Rural	19.2%	462,669	100.1	(95.6 - 104.6)	83.5	(79.8 - 87.2)	390	23.4%
Urban	75.9%	1,831,671	97.4	(94.9 - 100.0)	63.1	(61.5 - 64.7)	1,160	69.5%

1 Rate per 100,000 population

2 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; race/ethnicity data derived using percentage of total population from 2003 Census Bureau Estimates; mortality data from Utah Death Certificate Database, Office of Vital Records, Utah Department of Health

ICD 10 codes II11, I20-I25

Stroke Mortality

Why is it important?

Stroke (cerebrovascular disease) is the third leading cause of death in the U.S. and Utah. Stroke occurs when the blood supply to the brain is interrupted. There are two major types of stroke—ischemic and hemorrhagic (see appendix for definitions). In 2003, stroke accounted for about one of every 15 deaths in the U.S.[2] Stroke is also a leading cause of long term disability in the U.S.[5] Despite new treatments to restore blood flow for victims of ischemic stroke, many people with acute stroke do not arrive at the hospital early enough to receive these treatments.

Who is at risk?

Overall stroke mortality increases with age. Although stroke is more common in men, women have higher death rates. Nearly 40 percent of hemorrhagic strokes result in death within 30 days compared to about 10 percent of ischemic strokes.[5] Over 50 percent of deaths from strokes in the U.S. occurred outside the hospital.[8]

How big is the problem in Utah?

- Stroke is the third leading cause of death in Utah.

- Stroke accounted for more than 20% of all CVD deaths in 2005. (see figure 1.0)

- In 2003, Utah's age-adjusted mortality rate for stroke (53.1 deaths per 100,000) was 26th in the nation. In 2003, the U.S. mortality rate for stroke was 53.5 deaths per 100,000.[4]

- Age-adjusted mortality rates for stroke decreased 32.6% from 66.9 deaths per 100,000 in 1996 to 45.1 deaths per 100,000 in 2005.

- In Utah, between 1997 and 2005, females had a higher age-adjusted mortality rate from stroke when compared to males.

Figure 1.18   Stroke Mortality by Year and Gender, Utah and U.S., 1996-2005
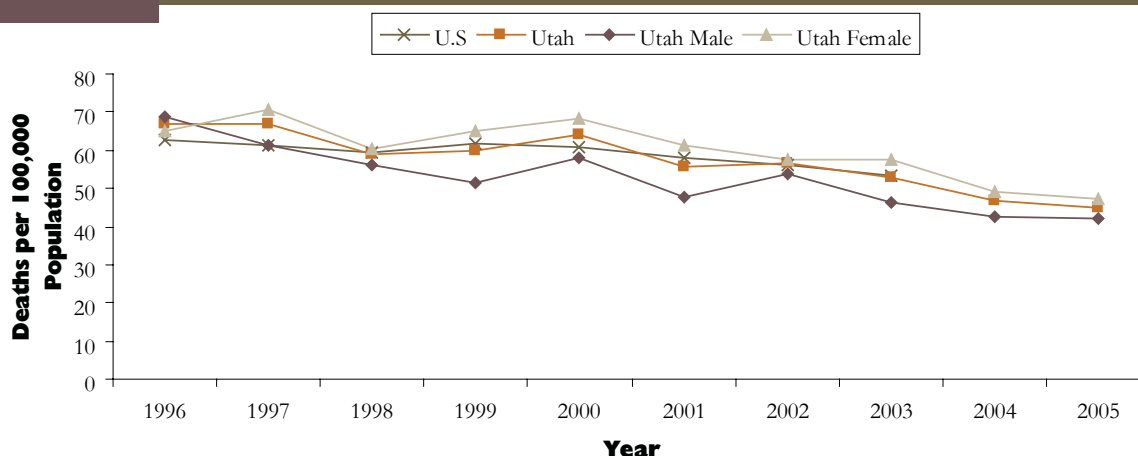
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
1996-1998: ICD 9 codes 430-438; 1999-2005: ICD 10 codes I60-I69
Age-adjusted to 2000 U.S. standard population
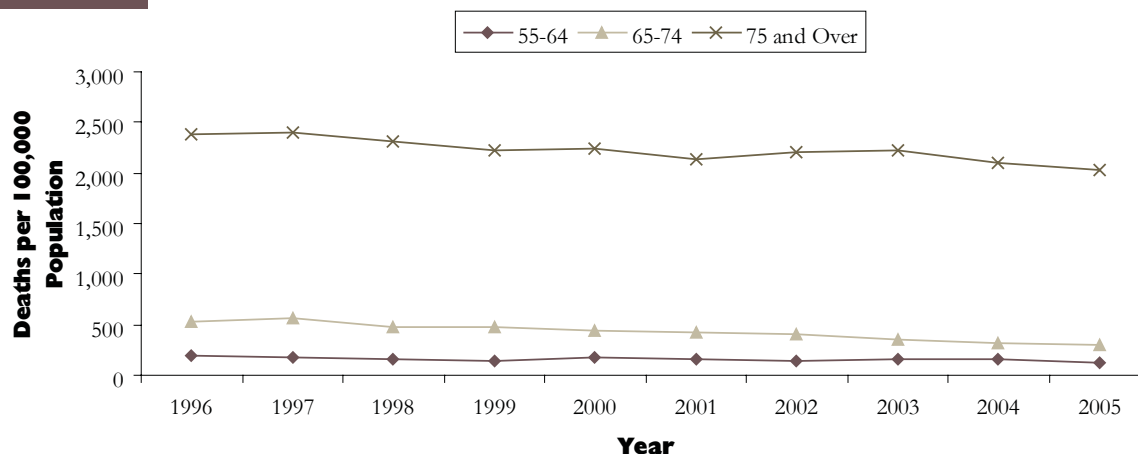Rates prior to 1999 multiplied by ratio of 1.0588 for comparability

Figure 1.19 **Stroke Mortality by Age, Utah Adults Age 55 and Over, 1996-2005**
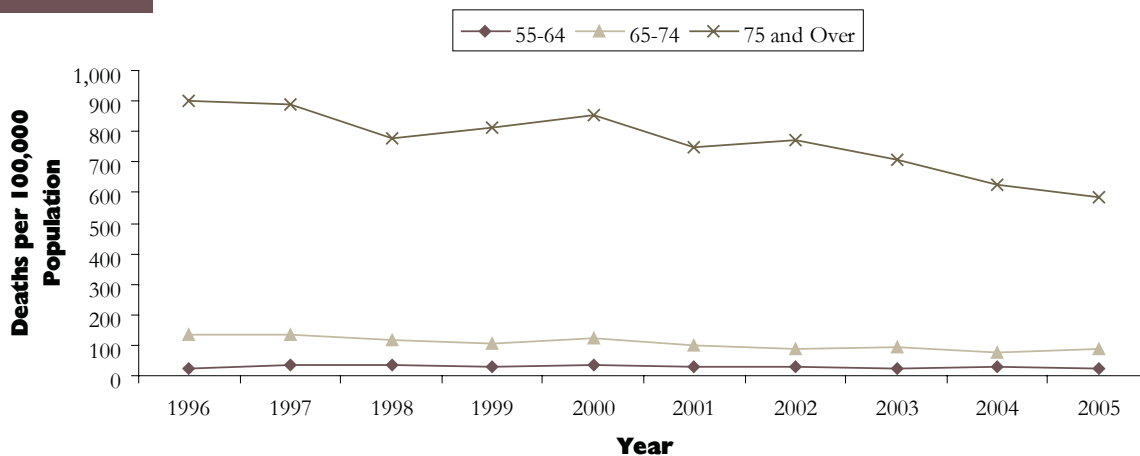
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
1996-1998: ICD 9 codes 430-438; 1999-2005: ICD 10 codes I60-I69
Rates prior to 1999 multiplied by ratio of 1.0588 for comparability

- Stroke mortality rates increased with age. Those age 75 and over had the highest mortality rate from stroke in 2005 with 586.1 deaths per 100,000.

- Between 1996 and 2005, stroke mortality rates decreased only for those ages 65 and over. Persons age 75 and older experienced the largest decrease (34.9%) from 900.5 per 100,000 in 1996 to 586.1 per 100,000 in 2005.

- White and Black residents had the highest age-adjusted stroke mortality rates between 2001 and 2005.

Figure 1.20 **Stroke Mortality by Race/Ethnicity, Utah, 2001-2005**
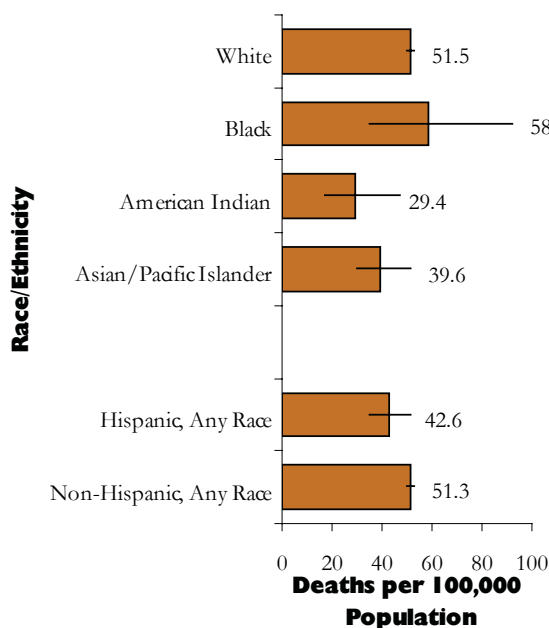
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I60-I69
Age-adjusted to 2000 U.S. standard population

Figure 1.21   *Stroke Mortality by Geographic Area, Utah, 2001-2005*
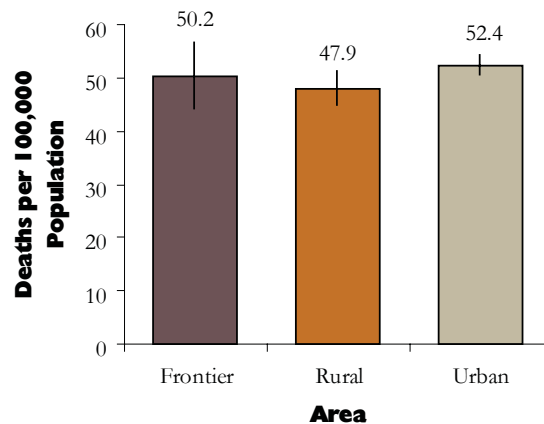
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I60-I69
Age-adjusted to 2000 U.S. standard population

- Urban areas had a higher age-adjusted stroke mortality rate (52.4 per 100,000) than frontier (50.2 per 100,000) and rural areas (47.9 per 100,000) between 2001 and 2005.

Table 1.22 **Stroke Mortality by Demographic Characteristic, Utah, 2001-2005**

	Utah Population		Stroke Mortality					
	Distribution	Number of Persons	Age-adjusted Rate[1]	95% CI	Crude Rate[1]	95% CI	Number of Deaths[2]	Distribution of Deaths
All Utahns	100%	2,413,618	51.2	(49.7 - 52.8)	34.8	(33.8 - 35.9)	840	100.0%
Gender								
Male	50.3%	1,215,077	46.4	(44.1 - 48.7)	27.2	(25.9 - 28.5)	330	39.3%
Female	49.7%	1,198,541	54.4	(52.3 - 56.6)	42.5	(40.9 - 44.2)	510	60.7%
Age Group								
0-54	84.6%	2,041,335			2.0	(1.7 - 2.2)	40	4.7%
55-64	7.0%	169,033			26.8	(23.4 - 30.3)	50	5.9%
65-74	4.4%	107,232			89.5	(81.5 - 97.5)	100	11.8%
75 and Over	4.0%	96,018			686.1	(662.8 - 709.5)	660	77.6%
Race Alone								
White	93.9%	2,265,525	51.5	(49.9 - 53.1)	36.7	(35.6 - 37.8)	830	98.8%
Black	0.9%	22,405	58.3	(34.7 - 91.9)	17.2	(10.6 - 27.9)	0	0.0%
American Indian	1.4%	32,904	29.4	(17.0 - 47.2)	13.0	(8.3 - 20.5)	0	0.0%
Asian/Pacific Islander	2.6%	61,574	39.6	(29.7 - 51.7)	19.1	(14.7 - 24.8)	10	1.2%
Ethnicity								
Hispanic	10.3%	248,069	42.6	(35.2 - 51.1)	11.7	(10.0 - 13.9)	30	3.5%
Non-Hispanic	89.7%	2,165,549	51.3	(49.7 - 52.9)	38.0	(36.8 - 39.2)	820	96.5%
Geographic Area								
Frontier	4.9%	119,278	50.2	(44.3 - 56.6)	44.4	(39.1 - 49.8)	50	6.0%
Rural	19.2%	462,669	47.9	(44.9 - 51.1)	39.7	(37.2 - 42.3)	180	21.7%
Urban	75.9%	1,831,671	52.4	(50.5 - 54.3)	32.9	(31.8 - 34.1)	600	72.3%

1 Rate per 100,000 population

2 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; race/ethnicity data derived using percentage of total population from 2003 Census Bureau Estimates; mortality data from Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
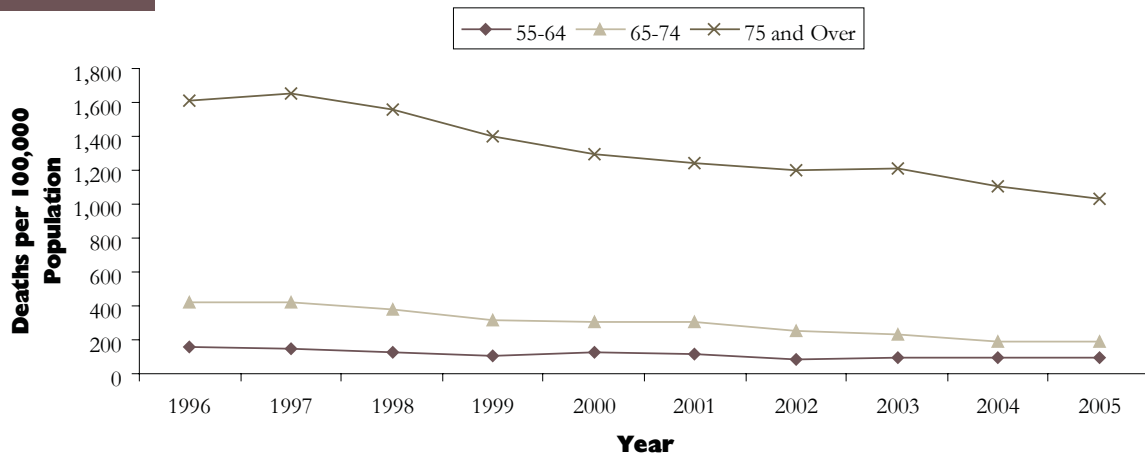
ICD 10 codes I60-I69

Implications

Though CVD mortality has decreased in Utah, it remains the leading cause of death for both men and women in the state. Healthy People 2010 goals for the U.S. target a 20% reduction in both stroke and coronary heart disease mortality over 10 years.[9] The age-adjusted coronary heart disease death rate for Utah in 2005 was 88.3 per 100,000. This is lower than the national rate and below the 2010 target of 166 per 100,000. However, the 2005 age-adjusted stroke mortality rate in Utah (45.1 per 100,000) exceeds the target goal for the U.S. (48 per 100,000).

Despite the decrease in mortality from CVD over the past several years, a substantial burden persists. Efforts to reduce both morbidity and mortality from CVD will remain important for the health of Utahns.

Chapter Two
Hospitalization

Cardiovascular Disease Hospitalization

Why is it important?

Cardiovascular disease is the leading cause of hospitalization in the U.S. compared to all other disease categories. Between 1979 and 2003, the number of hospitalizations for CVD increased by almost one-third.[5] In 2003, more than 6.8 million individuals in the U.S. had an inpatient cardiovascular operation or a procedure to restore blood supply to the heart muscle. Such procedures included heart bypass or angioplasty (dilating the coronary arteries) or placement of a stent.[5](See glossary.)

Who is at risk?

Compared to individuals with single risk factors, persons with multiple risk factors have a greater chance of requiring hospitalization to treat a heart attack or stroke or to have a procedure to improve blood flow.[5] In 2003, more hospital procedures to improve blood flow to the heart were performed for males than for females. Older age is associated with an increased risk for CVD-related hospitalization. Persons with chronic cardiovascular conditions, such as heart failure, may also require hospitalization.

How big is the problem in Utah?

- The Utah hospitalization rate for CVD was lower than the national rate. In 2003, the age-adjusted U.S. hospitalization rate for CVD was 209.1 per 10,000 compared to the Utah rate of 113.7 per 10,000.[10]

- The age-adjusted hospitalization rate for CVD in Utah declined 13.6% from 127.9 per 10,000 in 1996 to 110.5 per 10,000 in 2005.

- The age-adjusted CVD hospitalization rate for Utah males (138.8 per 10,000) was higher than the rate for females (85.5 per 10,000).

Figure 2.0 — Cardiovascular Disease Hospitalization by Year and Gender, Utah, 1996-2005
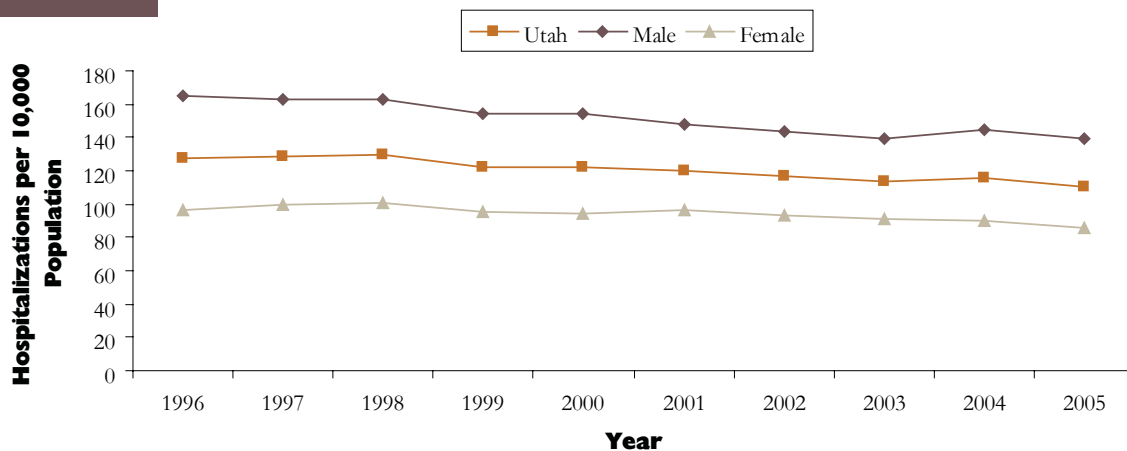
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 390-448
Age-adjusted to 2000 U.S. standard population

Figure 2.1 **Cardiovascular Disease Hospitalization by Age, Utah Adults Age 55 and Over, 1996-2005**
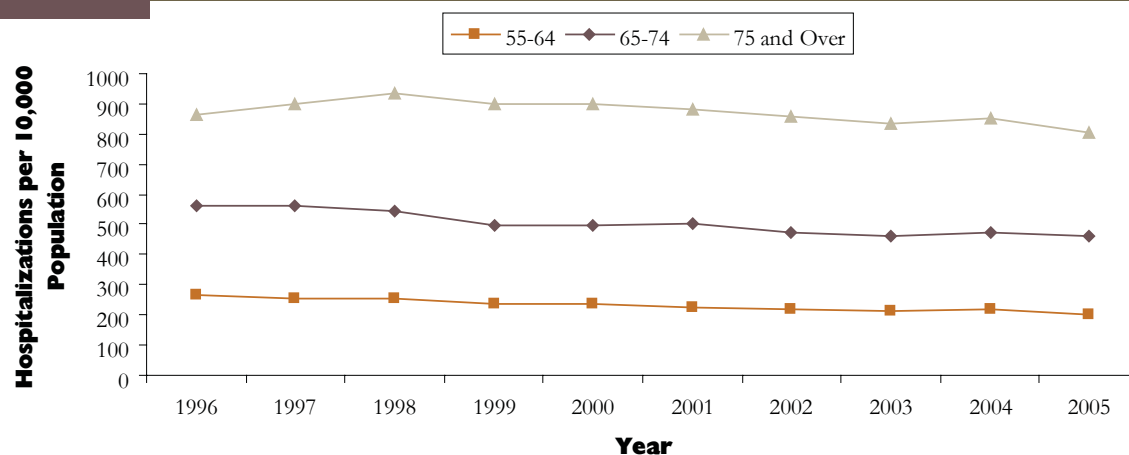
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 390-448

- In Utah, nearly 65% of the CVD hospitalizations between 2001 and 2005 occurred among persons 65 years and older.

- Hospitalization rates from CVD declined for all age groups over time, with those age 55 to 64 seeing the largest decrease, from 263.9 per 10,000 in 1996 to 200.3 per 10,000 in 2005.

- Age-adjusted hospitalization rates from CVD between 1996 and 2005 were similar between frontier, rural, and urban areas.

Figure 2.2 **Cardiovascular Disease Hospitalization by Geographic Area, Utah, 1996-2005**

Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 390-448
Age-adjusted to 2000 U.S. standard population

Figure 2.3   **Average Annual Charges For All Cardiovascular Disease Hospitalizations and Emergency Department Visits by Primary Payer, Utah 2001-2005**

Self Pay
$7,224,000
1.6%

Other
$1,730,000
0.4%

Managed Care
$85,775,000
18.6%

Commercial Plans
$55,060,000
12.0%

Government
$310,368,000
67.4%

Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health; Emergency Department Encounter Database, Bureau of Emergency Medical Services, Utah Department of Health
ICD 9 codes 390-448

• Between 2001 and 2005, the average annual charge for all CVD hospitalizations and emergency department visits in Utah reached $460 million. Government funds paid for the majority of those charges.

• The increase in average charge per hospitalization for CVD between 2001 and 2005 (48.3%) was greater than the increase for all hospitalizations (43.2%) during the same time period.

Figure 2.4   **Average Charge per Hospitalization by Primary Diagnosis, Utah 1996-2005**
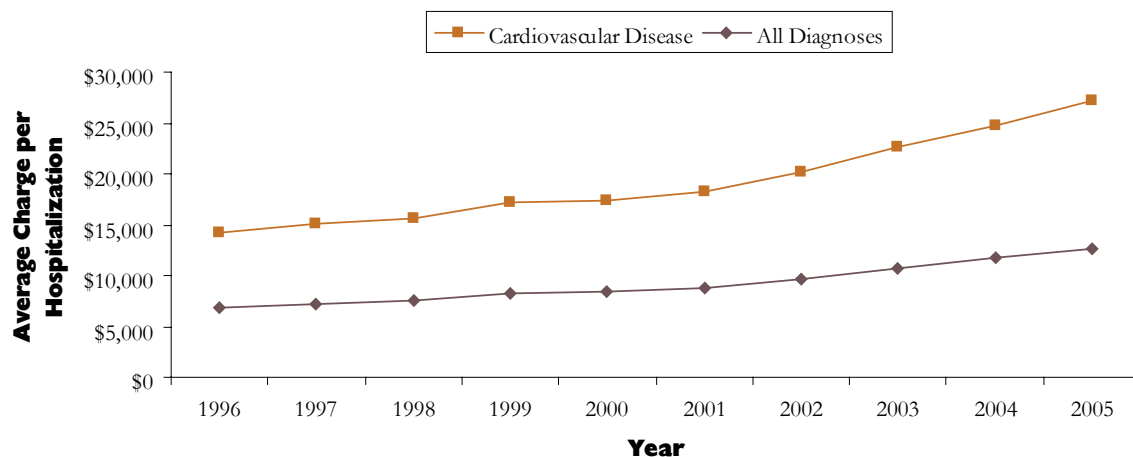
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes for cardiovascular disease 390-448

Table 2.5 **Cardiovascular Disease Hospitalization by Demographic Characteristic, Utah 2001-2005**

	Utah Population		Cardiovascular Disease Hospitalization					
	Distribution	Number of Persons	Age-adjusted Rate[1]	95% CI	Crude Rate[1]	95% CI	Number Hospitalized[2]	Distribution
All Utahns	100%	2,413,618	115.4	(114.7 - 116.1)	85.2	(84.7 - 85.7)	20,560	100.0%
Gender								
Male	50.3%	1,215,077	143.0	(141.9 - 144.2)	97.3	(96.5 - 98.1)	11,820	57.5%
Female	49.7%	1,198,541	91.1	(90.3 - 92.0)	72.9	(72.2 - 73.6)	8,740	42.5%
Age Group								
0-54	84.6%	2,041,335			18.2	(17.9 - 18.5)	3,720	18.1%
55-64	7.0%	169,033			215.6	(212.5 - 218.7)	3,640	17.7%
65-74	4.4%	107,232			473.6	(467.4 - 479.3)	5,080	24.7%
75 and Over	4.0%	96,018			845.6	(837.8 - 853.5)	8,120	39.5%
Geographic Area								
Frontier	4.9%	119,278	121.6	(118.8 - 124.6)	112.9	(110.3 - 115.6)	1,350	6.6%
Rural	19.2%	462,669	114.2	(112.7 - 115.7)	97.3	(96.0 - 98.6)	4,500	21.9%
Urban	75.9%	1,831,671	115.3	(114.4 - 116.1)	80.3	(79.7 - 80.9)	14,710	71.5%

1 Rate per 10,000 population

2 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Sources: Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; hospitalization data from Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health

ICD 9 codes 390-448

Coronary Heart Disease Hospitalization

Why is it important?

From 1979 to 2003, the number of hospitalizations for coronary heart disease (CHD) in the U.S. increased by 16 percent.[5] In 2001, the cost paid by Medicare for CHD alone exceeded $11 billion. Projections for heart disease costs in the U.S. were expected to exceed $142.5 billion by the end of 2006, including health care services, medications, and lost productivity.[2]

Who is at risk?

Individuals with any CVD risk factor are more likely to be hospitalized for CHD. The presence of more than one risk factor increases the risk substantially.[11] In addition, those who have suffered a heart attack in the past are at high risk for recurrent heart disease or stroke. After age 40, the lifetime risk of developing CHD for men is 49% and 32% for women.[5] It is estimated that 18 percent of males and 35 percent of females will experience another heart attack within six years of their first heart attack. It is also estimated that eight percent of males and 11 percent of females who have had a heart attack will suffer a stroke within six years.[5]

How big is the problem in Utah?

- The Utah hospitalization rate for CHD is lower than the national rate. In 2003, the age-adjusted U.S. hospitalization rate for CHD was 71.6 per 10,000, compared to Utah's age-adjusted rate of 41.9 per 10,000.[10]

- The age-adjusted hospitalization rate for CHD in Utah has declined by almost 27% from 55.1 per 10,000 in 1996 to 40.3 per 10,000 in 2005.

- The age-adjusted CHD hospitalization rate for Utah males was more than twice the rate for females. In 2005 the rate was 59.2 per 10,000 for males compared to 23.4 per 10,000 for females.

- Nearly 59% of CHD hospitalizations between 2001 and 2005 in Utah occurred among those age 65 and over.

Figure 2.6   **Coronary Heart Disease Hospitalization by Year and Gender, Utah, 1996-2005**
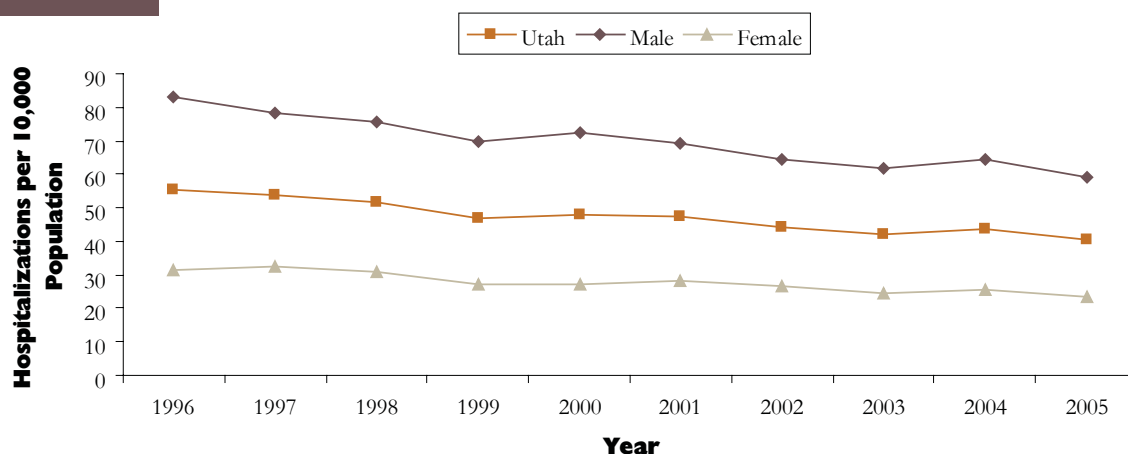
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 402, 410-414, 429.2
Age-adjusted to 2000 U.S. standard population

Figure 2.7 **Coronary Heart Disease Hospitalization by Age, Utah Adults Age 55 and Over, 1996-2005**
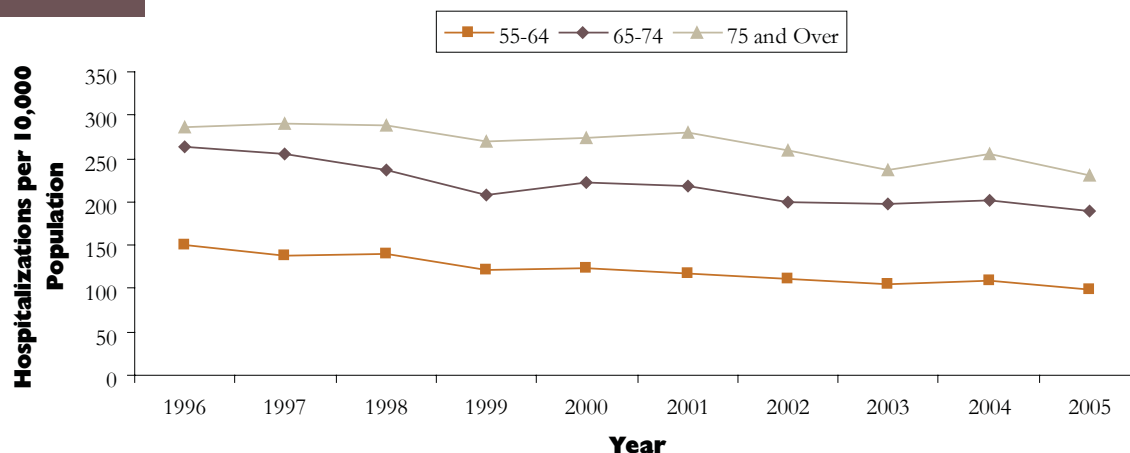
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 402, 410-414, 429.2

- Utah hospitalization rates from CHD declined for all age groups with those age 55 to 64 having the largest decrease (about 34%) from 149.7 per 10,000 in 1996 to 98.4 per 10,000 in 2005.

- Utahns residing in rural areas had a higher age-adjusted hospitalization rate (49.4 per 10,000) compared to those residing in urban (41.5 per 10,000) and frontier areas (45.0 per 10,000) between 2001 and 2005.

Figure 2.8 **Coronary Heart Disease Hospitalization by Geographic Area, Utah, 1996-2005**
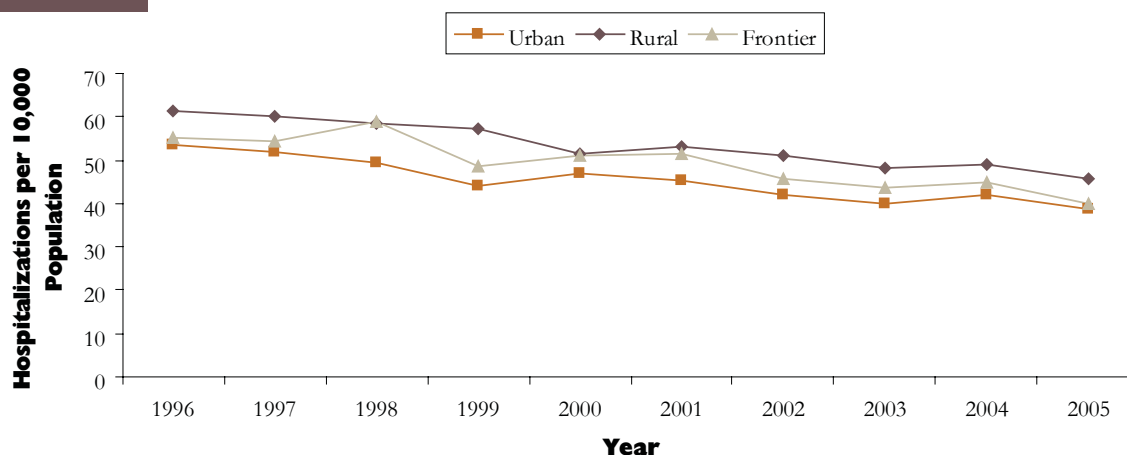
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 402, 410-414, 429.2
Age-adjusted to 2000 U.S. standard population

Figure 2.9   **Average Annual Charges for All Coronary Heart Disease Hospitalizations and Emergency Department Visits by Primary Payer, Utah 2001-2005**

Self Pay
$3,599,000
1.7%

Other
$798,000
0.4%

Managed Care
$45,446,000
21.1%

Commercial Plans
$29,308,000
13.6%

Government
$136,224,000
63.2%

Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health; Emergency Department En-counter Database, Bureau of Emergency Medical Services, Utah Department of Health
ICD 9 codes 402, 410-414, 429.2

- Between 2001 and 2005, the average annual charge for all CHD hospitalizations and emergency department visits in Utah reached $215 million. Government funds paid for the majority of those charges.

- The increase in average charge per hospitalization for CHD between 2001 and 2005 (52.6%) was greater than the increase for all hospitalizations (43.3%) during the same time period.

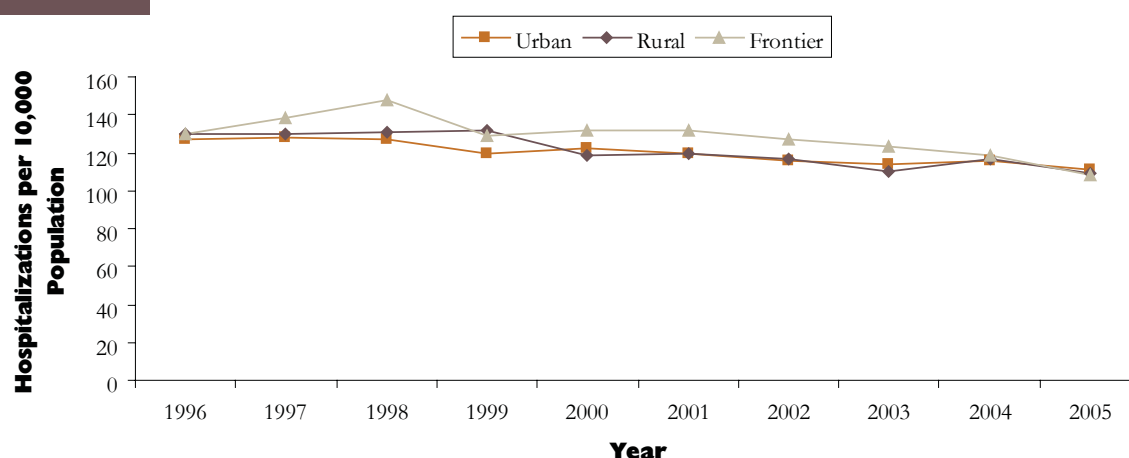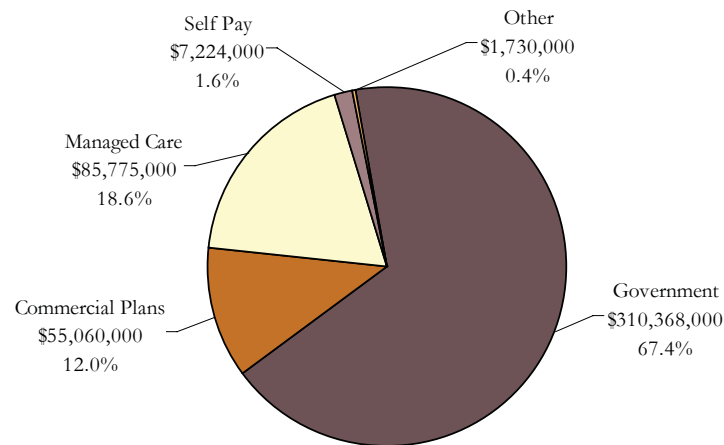**Figure 2.10**   **Average Charge per Hospitalization by Primary Diagnosis, Utah 1996-2005**
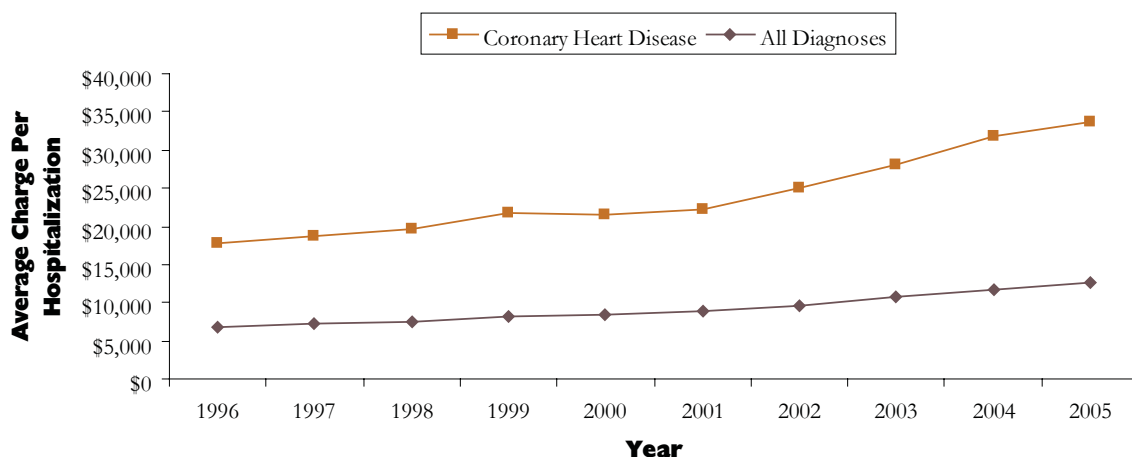
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes for coronary heart disease 402, 410-414, 429.2

Table 2.11 **Coronary Heart Disease Hospitalization by Demographic Characteristic, Utah 2001-2005**

	Utah Population		Coronary Heart Disease Hospitalization					
	Distribution	Number of Persons	Age-adjusted Rate[1]	95% CI	Crude Rate[1]	95% CI	Number Hospitalized[2]	Distribution
All Utahns	100%	2,413,618	43.4	(43.0 - 43.9)	32.5	(32.2 - 32.8)	7,850	100.0%
Gender								
Male	50.3%	1,215,077	63.7	(62.9 - 64.5)	44.6	(44.1 - 45.1)	5,420	69.0%
Female	49.7%	1,198,541	25.5	(25.1 - 26.0)	20.3	(19.9 - 20.6)	2,430	31.0%
Age Group								
0-54	84.6%	2,041,335			7.1	(6.9 - 7.3)	1,450	18.5%
55-64	7.0%	169,033			107.7	(105.5 - 109.9)	1,820	23.2%
65-74	4.4%	107,232			200.9	(197.1 - 204.6)	2,150	27.4%
75 and Over	4.0%	96,018			252.0	(247.8 - 256.7)	2,420	30.9%
Geographic Area								
Frontier	4.9%	119,278	45.0	(43.3 - 46.8)	42.5	(40.8 - 44.1)	510	6.5%
Rural	19.2%	462,669	49.4	(48.4 - 50.4)	42.1	(41.3 - 43.0)	1,950	24.8%
Urban	75.9%	1,831,671	41.5	(41.0 - 42.0)	29.4	(29.1 - 29.8)	5,390	68.7%

1 Rate per 10,000 population

2 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Sources: Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; hospitalization data from Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health

ICD 9 codes 402, 410-414, 429.2

Heart Failure Hospitalization

Why is it important?

Hospitalizations for heart failure have increased in the U.S. and it is now the most common diagnosis for hospitalized Medicare patients.[6] Estimates of the direct costs of heart failure in 2006 exceeded $29.6 billion.[5] Heart failure often develops following a heart attack. It is estimated that 22 percent of males and 46 percent of females who have experienced a heart attack will develop heart failure within six years.[5]

Who is at risk?

The most common causes of heart failure are coronary heart disease, hypertension and diabetes. While diabetes increases the risk of heart disease for both genders, the impact is particularly strong among women.[5] If heart failure becomes so severe that outpatient management can no longer control the symptoms, individuals require hospitalization. Among Utah Medicare recipients, Blacks are hospitalized for heart failure more frequently than Whites.[7]

How big is the problem in Utah?

- The Utah hospitalization rate for heart failure is lower than the national rate. In 2003, the U.S. age-adjusted hospitalization rate for heart failure was 37.5 per 10,000 compared to the Utah age-adjusted rate of 18.0 per 10,000.[10]

- Overall, the hospitalization rate for heart failure declined 7.9% from 17.8 per 10,000 in 1996 to 16.4 per 10,000 in 2005; however, this decline was not steady across the ten-year period.

- Age-adjusted hospitalization rates for heart failure remained relatively constant between 1996 and 2005.

- Between 2001 and 2005, 77.4% of heart failure hospitalizations in Utah occurred among those 65 years and older.

Figure 2.12   **Heart Failure Hospitalization by Year and Gender, Utah, 1996-2005**
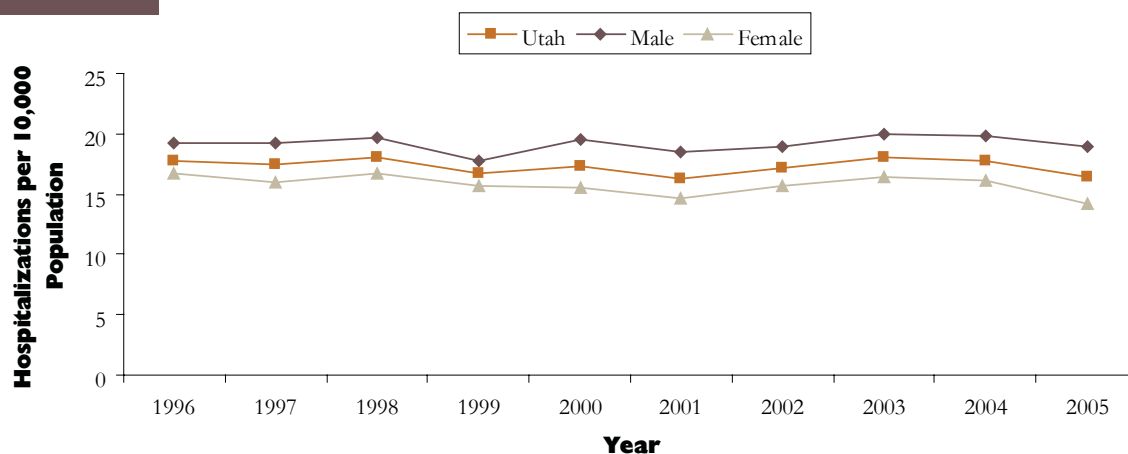
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 428
Age-adjusted to 2000 U.S. standard population

Figure 2.13 **Heart Failure Hospitalization by Age Adults Age 55 and Over, Utah, 1996-2005**
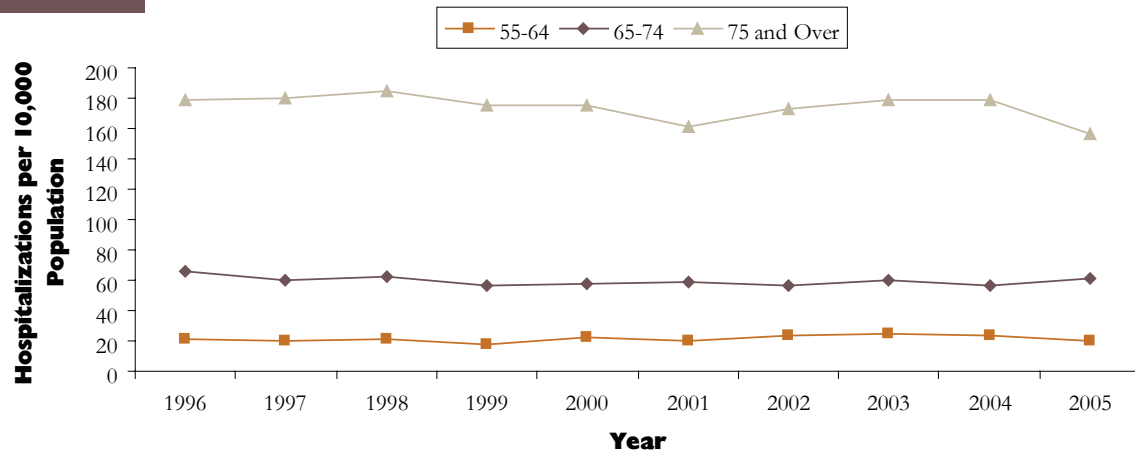
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 428

- The heart failure hospitalization rate for those age 75 and over decreased slightly between 1996 and 2005 from 178.6 per 10,000 to 156.4 per 10,000. Most of this decrease occurred between 1996 and 2001.

- Utahns residing in frontier areas had a higher age-adjusted hospitalization rate for heart failure compared to those residing in urban and rural areas for all years between 1996 and 2005.

Figure 2.14 **Heart Failure Hospitalization by Geographic Area, Utah, 1996-2005**

Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 428
Age-adjusted to 2000 U.S. standard population

Figure 2.15 Average Annual Charges for All Heart Failure Hospitalizations and Emergency Department Visits by Primary Payer, Utah 2001-2005

Other
$212,000
0.5%

Self Pay
$418,000
0.9%

Managed Care
$5,595,000
12.0%

Commercial Plans
$3,452,000
7.4%

Government
$37,049,000
79.3%

Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health; Emergency Department Encounter Database, Bureau of Emergency Medical Services, Utah Department of Health
ICD 9 codes 428

- Between 2001 and 2005, the average annual charge for all heart failure hospitalizations and emergency department visits in Utah reached $46 million. Government funds paid for the majority of those charges.

- The increase in average charge per hospitalization for heart failure between 2002 and 2005 (70.2%) was more than twice the increase for all hospitalizations (31.7%). Between 1996 and 2005, the average charge for heart failure hospitalizations increased 159.5%.

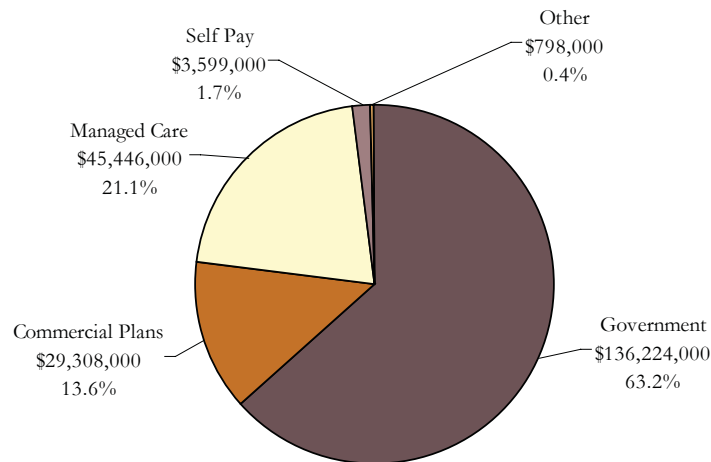**Figure 2.16** Average Charge per Hospitalization by Primary Diagnosis, Utah 1996-2005
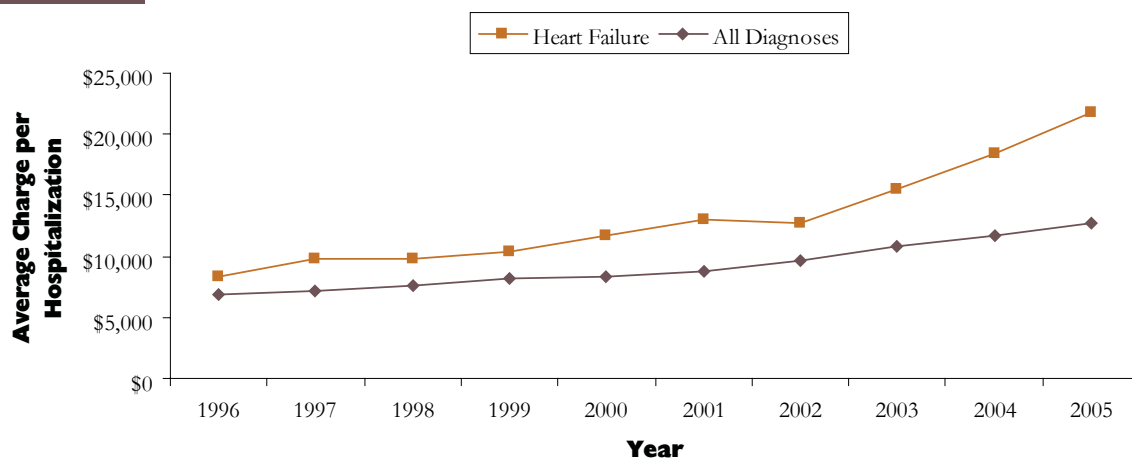
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes for heart failure 428

Table 2.17 **Heart Failure Hospitalization by Demographic Characteristic, Utah 2001-2005**

	Utah Population		Heart Failure Hospitalization					
	Distribution	Number of Persons	Age-adjusted Rate[1]	95% CI	Crude Rate[1]	95% CI	Number Hospitalized[2]	Distribution
All Utahns	100%	2,413,618	17.1	(16.9 - 17.4)	12.1	(11.9 - 12.3)	2,920	100.0%
Gender								
Male	50.3%	1,215,077	19.2	(18.8 - 19.7)	12.1	(11.8 - 12.4)	1,470	50.3%
Female	49.7%	1,198,541	15.4	(15.0 - 15.7)	12.1	(11.8 - 12.4)	1,450	49.7%
Age Group								
0-54	84.6%	2,041,335			1.4	(1.3 - 1.5)	280	9.6%
55-64	7.0%	169,033			22.3	(21.3 - 23.3)	380	13.0%
65-74	4.4%	107,232			58.5	(56.5 - 60.6)	630	21.6%
75 and Over	4.0%	96,018			169.8	(166.1 - 173.4)	1,630	55.8%
Geographic Area								
Frontier	4.9%	119,278	21.1	(19.9 - 22.3)	19.1	(18.0 - 20.2)	230	7.9%
Rural	19.2%	462,669	14.6	(14.1 - 15.1)	12.2	(11.8 - 12.7)	570	19.5%
Urban	75.9%	1,831,671	17.6	(17.3 - 17.9)	11.6	(11.4 - 11.8)	2,120	72.6%

1 Rate per 10,000 population

2 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Sources: Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; hospitalization data from Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health

ICD 9 codes 428

Stroke Hospitalization

Why is it important?

Stroke is a leading cause of disability in the U.S. Hospitalizations for stroke increased by nearly one-third over a 24-year period (1979 to 2003).[5] The costs for stroke, including lost productivity and treatment, were estimated to reach nearly $58 billion in 2006.[12]

Who is at risk?

Hypertension, diabetes and smoking are risk factors for stroke. Increasing age also puts a person at risk. Additionally, males are more likely to have a stroke than females. The risk of hospitalization for stroke is more than 70 percent greater in Blacks than Whites.[5] Atrial fibrillation, a common heart arrhythmia, is also a risk factor. Transient ischemic attack, commonly known as TIA (see glossary), is a very strong risk factor for an impending stroke.[2] Individuals who have experienced a prior heart attack or stroke are also at greater risk for a future stroke.

How big is the problem in Utah?

- The Utah hospitalization rate for stroke is lower than the national rate. In 2003, the age-adjusted U.S. hospitalization rate for stroke was 33.1 per 10,000, compared to the Utah rate of 16.5 per 10,000.[10]

- The age-adjusted hospitalization rate for stroke in Utah declined slightly from 19.7 per 10,000 in 1996 to 15.4 per 10,000 in 2005.

- Age-adjusted hospitalization rates are higher for Utah males than females. In 2005, the age-adjusted hospitalization rate for Utah males was 16.4 per 10,000 compared to the female rate of 14.6 per 10,000.

- Between 2001 and 2005, 72.4% of stroke hospitalizations in Utah occurred among persons age 65 and older.

Figure 2.18 Stroke Hospitalization by Year and Gender, Utah, 1996-2005
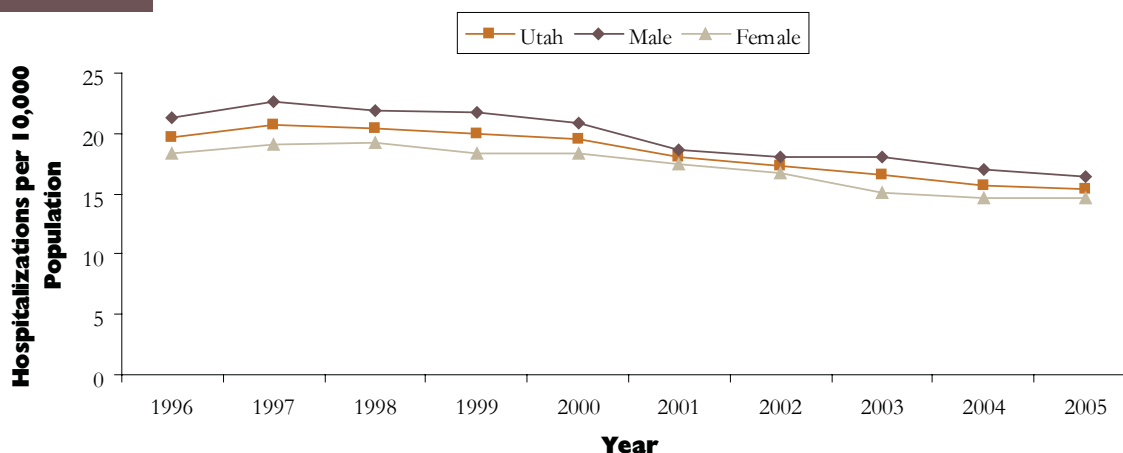
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 430-434, 436-438
Age-adjusted to 2000 U.S. standard population

Figure 2.19 **Stroke Hospitalization by Age, Utah Adults Age 55 and Over, 1996-2005**
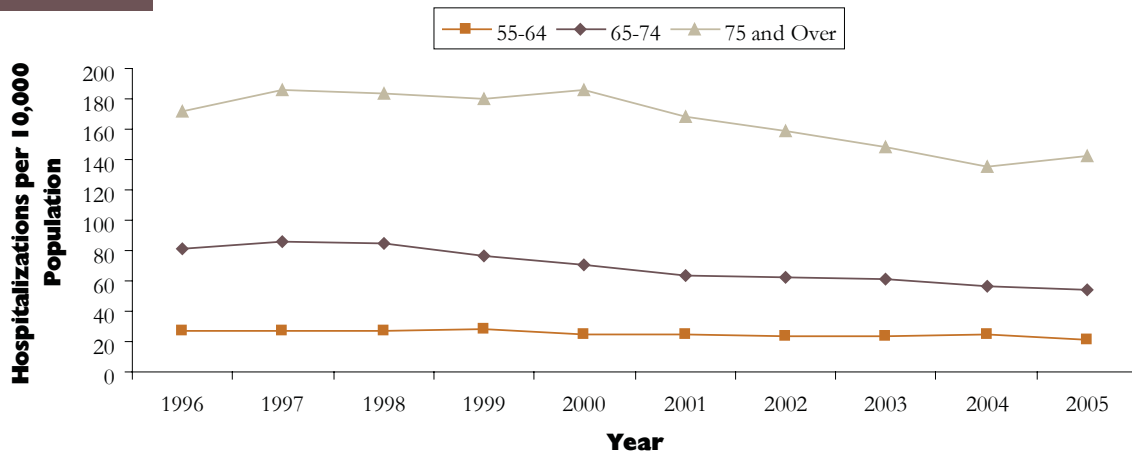
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 430-434, 436-438

• Overall, Utah stroke hospitalization rates declined for all age groups between 1996 and 2005, with ages 65 to 74 having the largest decrease, from 80.9 per 10,000 to 54.2 per 10,000.

• Utahns residing in urban areas had a higher age-adjusted stroke hospitalization rate compared to rural and frontier areas. This difference could be the result of access to care. However, missing data on access to care and stroke incidence are needed to more accurately interpret this data. For this reason these results should be interpreted with caution.

Figure 2.20 **Stroke Hospitalization by Geographic Area, Utah, 1996-2005**

Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 430-434, 436-438
Age-adjusted to 2000 U.S. standard population

Figure 2.21   Average Annual Charges For All Stroke Hospitalizations and Emergency Department Visits by Primary Payer, Utah 2001-2005

Other
$148,000
0.3%

Self Pay
$1,089,000
2.3%

Managed Care
$7,697,000
16.1%

Commercial Plans
$5,190,000
10.9%

Government
$33,641,000
70.4%

Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health; Emergency Department Encounter Database, Bureau of Emergency Medical Services, Utah Department of Health
ICD 9 codes 430-434, 436-438

- Between 2001 and 2005, the average annual charge for all stroke hospitalizations and emergency department visits in Utah reached $47 million. Government funds paid for the majority of those charges.

- The increase in average charge per hospitalization for stroke between 1996 and 2005 (93.3%) was slightly higher than the increase for all hospitalizations (84.3%).

Figure 2.22   Average Charge per Hospitalization by Primary Diagnosis, Utah 1996-2005
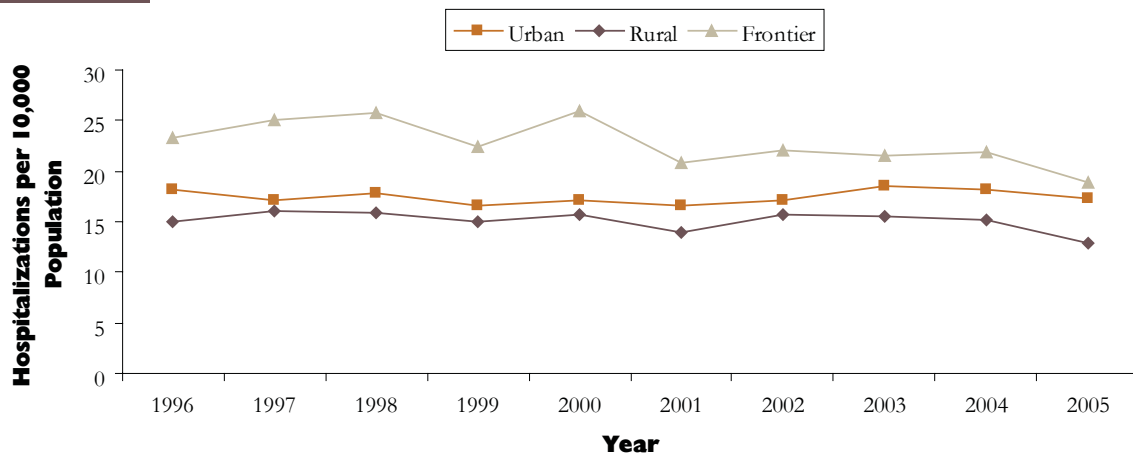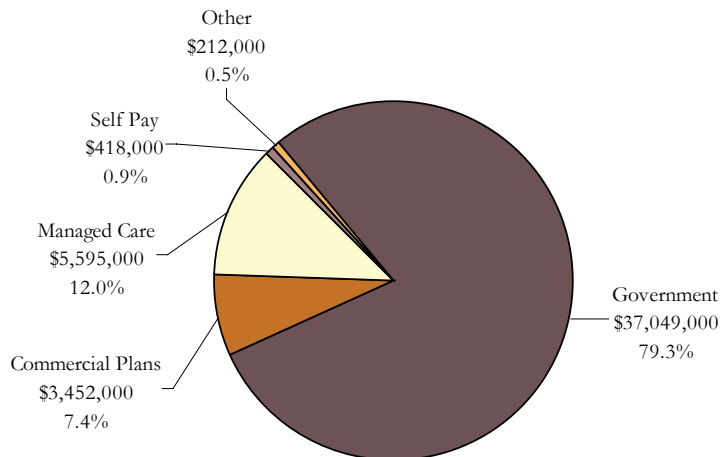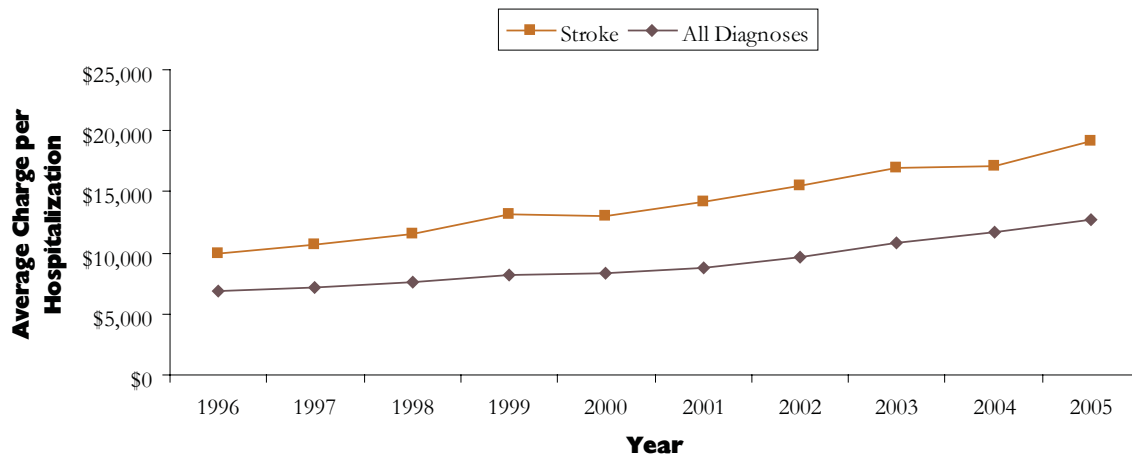
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes for heart failure 430-434, 436-438

Table 2.23 **Stroke Hospitalization by Demographic Characteristic, Utah 2001-2005**

	Utah Population		Stroke Hospitalization					
	Distribution	Number of Persons	Age-adjusted Rate[1]	95% CI	Crude Rate[1]	95% CI	Number Hospitalized[2]	Distribution
All Utahns	100%	2,413,618	16.6	(16.3 - 16.8)	11.9	(11.7 - 12.1)	2,870	100.0%
Gender								
Male	50.3%	1,215,077	17.6	(17.2 - 18.0)	11.4	(11.1 - 11.6)	1,380	48.1%
Female	49.7%	1,198,541	15.6	(15.3 - 16.0)	12.5	(12.2 - 12.7)	1,490	51.9%
Age Group								
0-54	84.6%	2,041,335			2.0	(1.9 - 2.1)	400	13.9%
55-64	7.0%	169,033			23.2	(22.2 - 24.2)	390	13.5%
65-74	4.4%	107,232			59.5	(57.4 - 61.5)	640	22.2%
75 and Over	4.0%	96,018			150.5	(147.0 - 153.9)	1,450	50.3%
Geographic Area								
Frontier	4.9%	119,278	14.5	(13.5 - 15.5)	13.2	(12.3 - 14.1)	160	5.6%
Rural	19.2%	462,669	14.5	(14.0 - 15.1)	12.3	(11.8 - 12.7)	570	19.8%
Urban	75.9%	1,831,671	17.4	(17.1 - 17.8)	11.7	(11.5 - 12.0)	2,150	74.7%

1 Rate per 10,000 population

2 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Sources: Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; hospitalization data from Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health

ICD 9 codes 430-434, 436-438

Stroke Treatment and Time of Arrival Following Symptom Onset

Why is it important?

Time is crucial in the diagnosis and treatment of acute stroke. Thrombolytic therapy (also known as tPA) can reduce disability by restoring blood flow to the brain during ischemic stroke, if given within three hours of symptom onset. Therefore, treatment teams need sufficient time to conduct special studies and tests to diagnose the exact type of stroke and determine whether the patient is eligible for thrombolytic therapy.[13] Eight Utah hospitals maintained special registries under the American Stroke Association's Get With The Guidelines Program starting in 2004 to track the number and types of stroke cases treated, along with indicators reflecting stroke diagnosis and treatment. Three large referral hospitals in Utah were also designated as JCAHO-certified stroke centers in 2003 and 2004. (See glossary.)

Who is at risk?

Stroke is a medical emergency and every second counts. Time lost before receiving treatment increases the risk of death or disability. By calling 9-1-1, potential stroke victims can be screened, time of onset of stroke symptoms ascertained, and the hospital emergency department notified to be ready to perform the necessary tests and initiate treatment quickly.[13] Lack of awareness of signs and symptoms of stroke and failure to call 9-1-1 put stroke victims at risk of missing the opportunity for treatment within the crucial three-hour window.

How big is the problem in Utah?

- Overall in Utah, the percentage of ischemic stroke patients who were treated at a designated stroke center increased from 28.8% in 1999 to 31.6% in 2004.

Figure 2.24   **Percentage of Ischemic Stroke Patients Admitted to One of Utah's Three Primary Stroke Centers*, Utah 1999-2004**
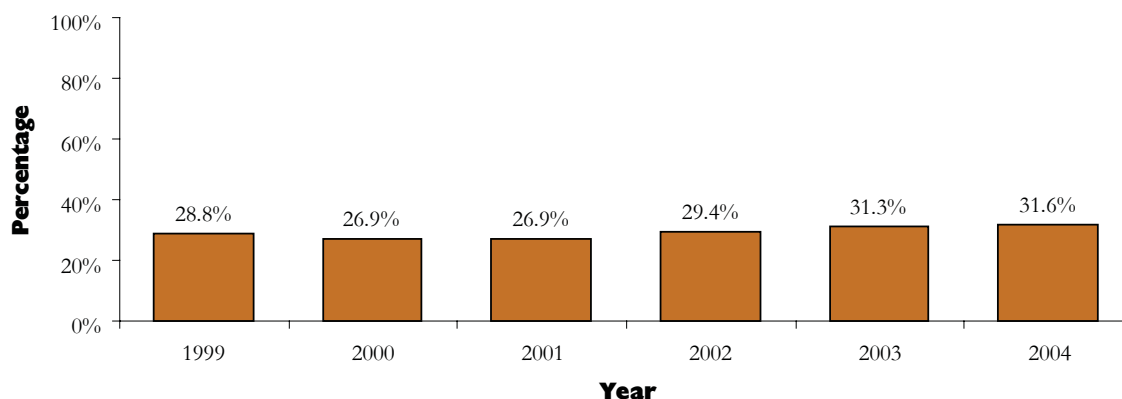
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 433, 434, 436;
*Primary stroke centers include University of Utah Hospital, LDS Hospital, and Utah Valley Regional Medical Center

Figure 2.25 **Percentage of Eligible* Ischemic Stroke Patients Who Received tPA at One of Eight Utah Get With The Guidelines Hospitals by Year, Utah, 2001-2005**
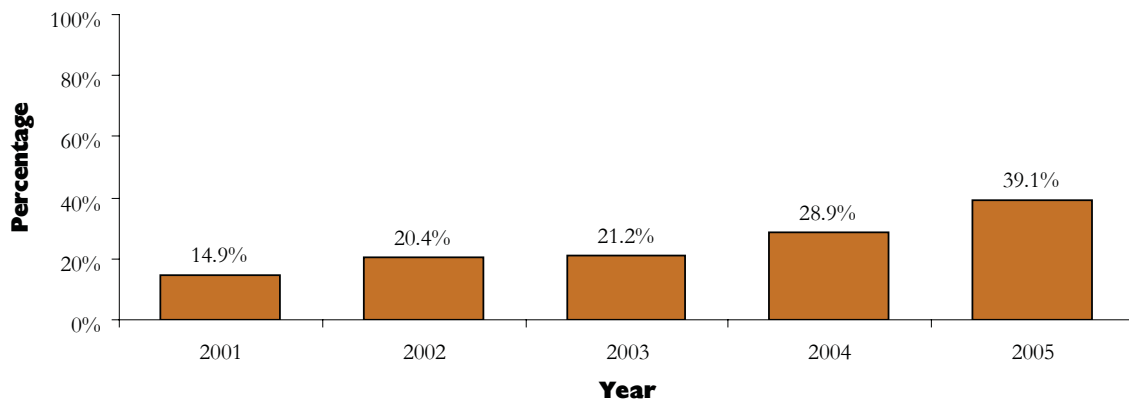
Source: Get With the Guidelines Outcome Data
Age-adjusted to 2000 U.S. standard population
*Eligible patients include only those patients who arrive at the hospital within 3 hours of symptom onset and who meet specific medical criteria

- The percentage of stroke victims treated in the eight Utah hospitals using the Get With The Guidelines Program who arrived within three hours and met the medical criteria to receive tPA increased from 14.9% in 2001 to 39.1% in 2005.

- Statewide, the percentage of all ischemic stroke patients who received tPA more than doubled from 0.7% in 2001 to 1.5% in 2005.

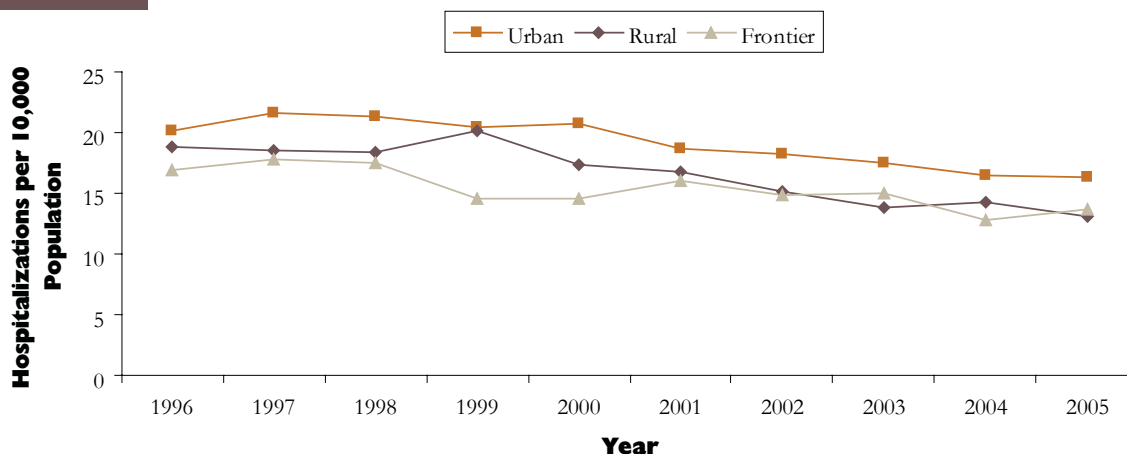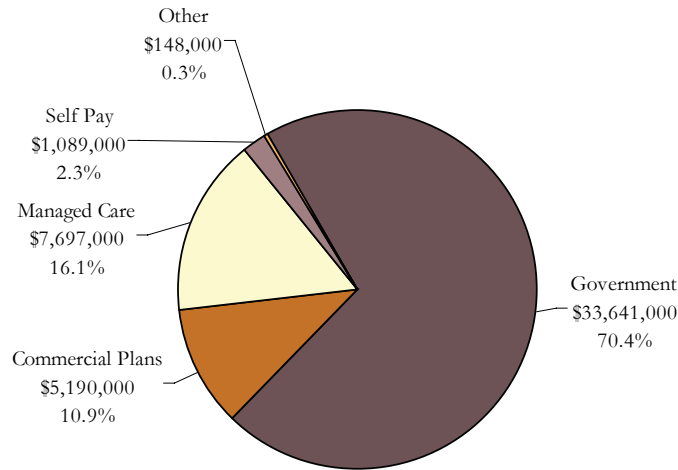**Figure 2.26** **Percentage of Ischemic Stroke Patients Who Receive tPA, All Utah Hospitals, 2001-2005**
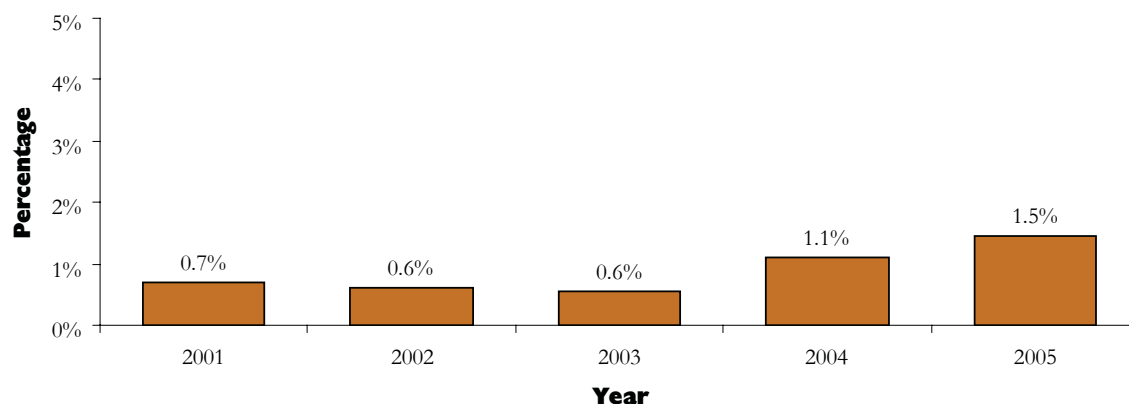
Source: Utah Inpatient Hospital Discharge Data, Office of Health Care Statistics, Utah Department of Health
ICD 9 codes 433, 434, 436;

Implications

Cardiovascular disease in Utah is costly. Though hospitalization rates for most forms of CVD have decreased in recent years, the costs of hospital care have increased. Between 2002 and 2006, the national cost for CVD was estimated to increase by more than $70 billion.[5,14] This represents an overall 19.5 percent increase in both direct and indirect costs for CVD. In Utah, total annual charges for all CVD hospitalizations alone increased 53.1 percent from $354 million in 2001 to $543 million in 2005. The average charge per hospitalization for heart disease and stroke is also increasing. Charges per individual hospitalization have increased nearly 90 percent for CVD, CHD and stroke since 1996. These increases are similar to the 84.3 percent increase in average individual charge for any hospitalization. Among the elderly, hospitalization for heart failure is a significant burden. Average charges for heart failure hospitalizations have increased almost 160 percent since 1996.

Increasing numbers of stroke victims in Utah are receiving prompt treatment to preserve brain function due in part to an increase in coordination of care, hospitals receiving Primary Stroke Center accreditation, an increase in the number of rural hospitals with Tele-Health capabilities, and implementation of Get With The Guidelines. However, challenges remain in outlying rural and frontier communities.

Chapter Three

Pre-transport Mortality and Knowledge of Signs and Symptoms

Pre-transport Mortality

Why is it important?

Pre-transport death is defined as all deaths that did not occur in the emergency room, in the hospital, or while a person was being transported to a health care facility. Approximately half of heart attack and stroke deaths occur before a patient is transported to a hospital. Treatments for sudden cardiac events like heart attack and stroke need to be administered shortly following symptom onset to be effective.

Sudden death from heart attack can occur when the heart beat becomes irregular. Dangerous cardiac arrhythmias must be treated immediately to prevent death. In 2002, it was estimated that more than 300,000 deaths from coronary heart disease occurred out of the hospital or in the emergency department, and nearly half of all stroke deaths occurred before a patient reached the hospital.[5,8]

Who is at risk?

The most crucial part of getting to the hospital is knowing whether or not someone is having a heart attack or stroke. By recognizing heart attack and stroke signs and symptoms and calling 9-1-1, individuals can activate help in time and prevent death.

People with extensive coronary artery disease are at risk for severe problems with heart arrhythmias whether they are aware of the disease or not. Two-thirds of unexpected cardiac deaths in the U.S. occurred without prior recognition of cardiac problems and about 60 percent were treated by Emergency Medical Services (EMS - see glossary).[5]

How big is the problem in Utah?

- Between 2001 and 2005, the majority of heart attack deaths (53.6%) occurred in a hospital; however, a substantial portion (45.0%) were classified as pre-transport deaths.

Figure 3.0   **Distribution of Heart Attack Deaths by Place of Death, Utah, 2001-2005**
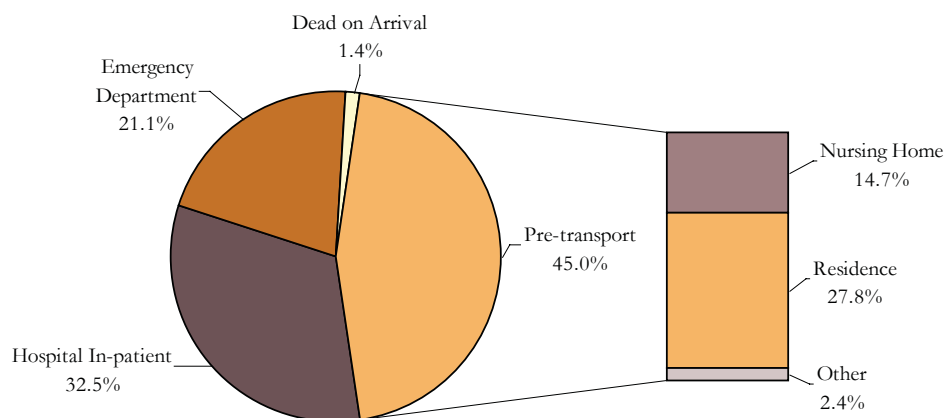
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I21-I22

Figure 3.1 **Distribution of Heart Attack Deaths by Place of Death and Year, Utah, 1996-2005**
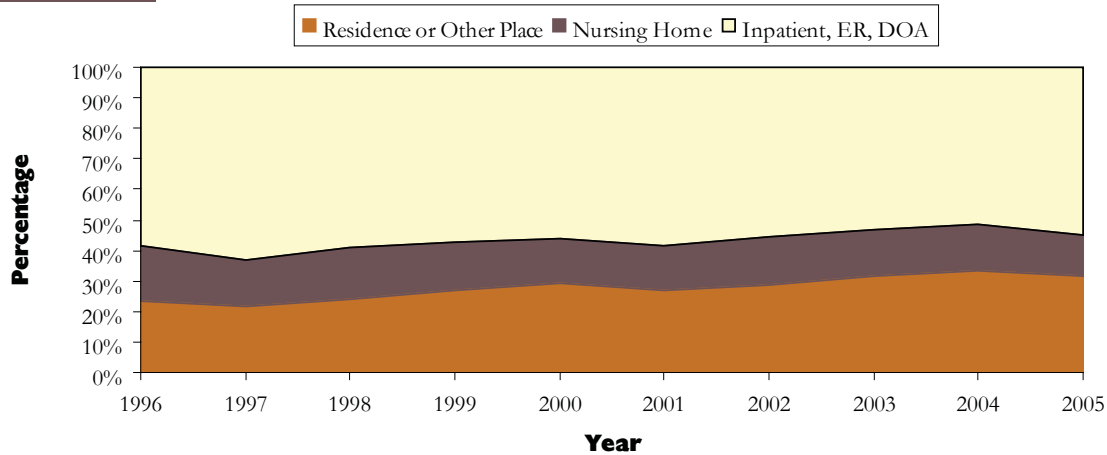
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I21-I22

- The proportion of heart attack deaths that occurred in a residence or other place increased from 23.6% in 1996 to 31.4% in 2005. The proportion of deaths that occurred in the hospital or nursing home both decreased.

- For stroke, the majority of deaths between 2001 and 2005 were classified as pre-transport (63.1%).

Figure 3.2 **Distribution of Stroke Deaths by Place of Death, Utah, 2001-2005**
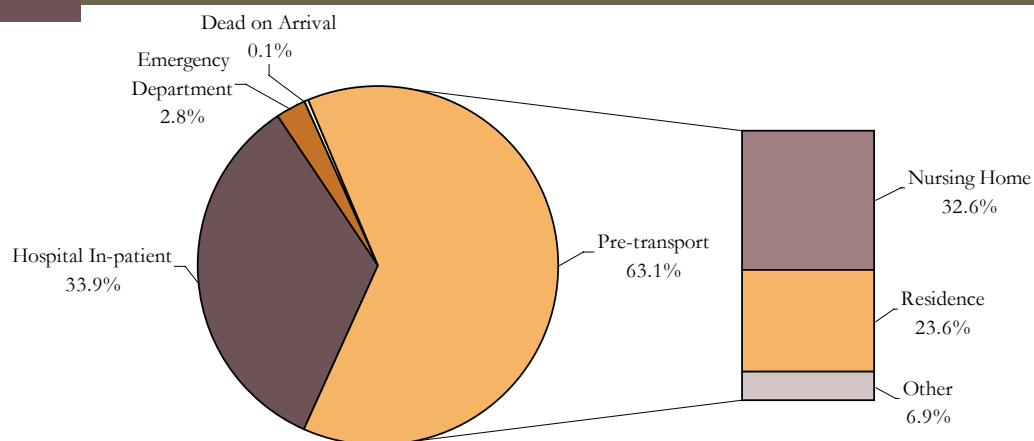
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I60-I69

Figure 3.3   *Distribution of Stroke Deaths by Place of Death and Year, Utah, 1996-2005*
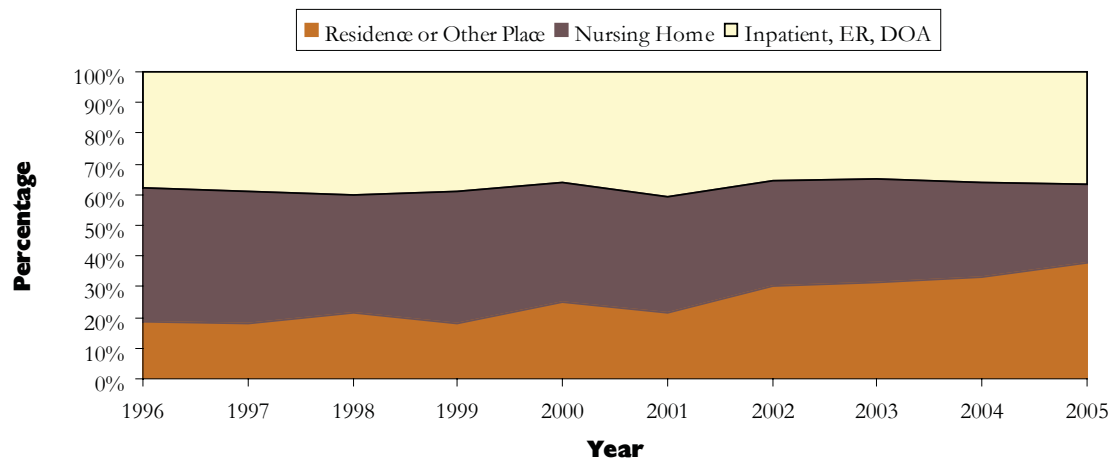
Source: Utah Death Certificate Database, Office of Vital Records, Utah Department of Health
ICD 10 codes I60-I69

- Overall, the percentage of stroke deaths that occurred outside the hospital remained relatively unchanged between 1996 and 2005. However, the proportion of stroke deaths that occurred at a nursing home declined from 43.3% in 1996 to 25.6% in 2005, while the proportion of stroke deaths that occurred in a residence increased from 18.9% in 1996 to 37.6% in 2005.

What does this data mean?

One of the problems in analyzing some of the data presented in this section is the inability to describe why a larger proportion of deaths is occuring in residences and a smaller proportion is occurring in nursing homes. In order to come to an accurate conclusion, we would need to know what percentage of those who went to the hospital arrived from a nursing home and what percentage came from a residence. This would allow us to more accurately describe the proportion of heart attack or stroke deaths that were pre-transport. Another important piece of information is the percentage of persons who die with "do-not-resuscitate" orders, as well as the percentage of persons who now choose hospice care as opposed to living in a nursing home. These data are not readily available, and as such, the results presented in this section of the report should be interpreted with caution.

Knowledge of Signs and Symptoms and Importance of 9-1-1

Why is it important?

The benefits of early treatment for heart attack and stroke are clear. Increased time from symptom onset to treatment for both heart attack and stroke is associated with increased morbidity and death. Yet delays in seeking treatment persist.[15] Use of Emergency Medical Services (see glossary) is important to ensure prompt assistance in the case of cardiac arrest, and pre-hospital notification is needed for prompt intervention to reduce the amount of heart muscle or brain affected.[16]

Who is at risk?

Women and minorities are more likely to delay seeking treatment; poverty and low educational levels are also associated with delays.[15] In 2001, only 19.6 percent of adults in the U.S. could identify the signs and symptoms of stroke; however, 46 percent could identify the signs and symptoms for heart attack.[5,15,17]

How big is the problem in Utah?

- In 2005, the age-adjusted percentage of adults who could identify the signs and symptoms for heart attack was 34.9% and the age-adjusted percentage who could identify the signs and symptoms for stroke was 47.5%.

- 84.8% of Utah adults who could identify the five signs and symptoms for heart attack said they would call 9-1-1 immediately if they or someone else were having a heart attack.

- Of those who could identify the five signs and symptoms for stroke in 2005, 86.1% said they would call 9-1-1 immediately if they or someone else was having a stroke.

Figure 3.4 Percentage of Adults Age 18 and Over Who Could Properly Identify the Five Signs and Symptoms for Heart Attack* or Stroke, Utah 2001-2003, 2005**
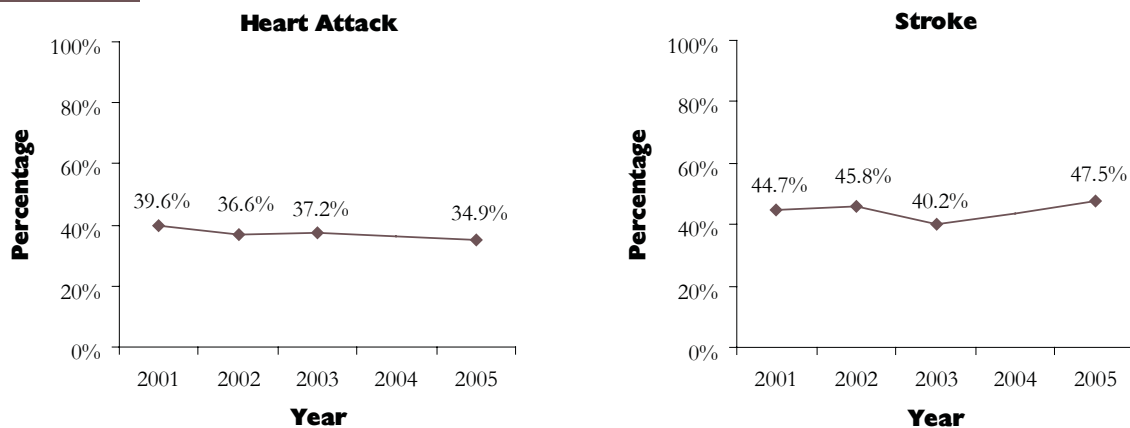
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population

*Signs and symptoms for heart attack include pain or discomfort in the jaw, neck, or back; feeling weak, lightheaded, or faint; chest pain or discomfort; pain or discomfort in the arms or shoulder; and shortness of breath.

**Signs and symptoms for stroke include sudden confusion or trouble speaking; sudden numbness or weakness of face, arm or leg, especially on one side; sudden trouble seeing in one or both eyes; sudden trouble walking, dizziness, or loss of balance; severe headache with no known cause.

Implications

Despite major advances in treatment for heart attack and stroke, many individuals delay seeking and reaching care and thus many do not benefit from treatment advances. Lack of public awareness of the need to call 9-1-1 for possible heart attack or stroke, coupled with a lack of knowledge of the signs and symptoms of heart attack and stroke, are public health challenges. Many lives could be saved and disability prevented in Utah if patients received care earlier. Campaigns to increase awareness in Utah have been launched, but additional efforts are needed to increase the knowledge of the signs and symptoms and the importance of calling 9-1-1 in these emergencies.

Chapter Four
Prevalence and Quality of Life

Prevalence of Cardiovascular Disease

Why is it important?

Cardiovascular disease is highly prevalent in the U.S. It is estimated that more than 71 million U.S. residents from all age groups have one or more forms of CVD.[5] Of those with CVD, more than seven million individuals have had a heart attack, and six-and-a-half million have angina. The Centers for Disease Control and Prevention (CDC) estimates that life expectancy would rise as much as seven years in the U.S. if all major forms of CVD were eliminated.

Who is at risk?

All adults are at risk for CVD. Major risk factors such as hypertension, obesity, and diabetes tend to occur simultaneously in individuals and augment the underlying risk factors such as family history and age. No ethnic groups are spared, and the burden of risk factors that overweight youth carry into adulthood has become a concern.[5,18]

How big is the problem in Utah?

*   The extent of the problem in Utah is best measured using self-reported BRFSS data (see appendix). Between 2001 and 2005, 3.5% of Utah adults age 18 and over reported being told they had angina or coronary heart disease, 3.2% reported ever having a heart attack, and 2.0% reported ever having a stroke.

| Figure 4.0 | Percentage of Adults Age 18 and Over Who Reported Having Coronary Heart Disease, a Heart Attack or a Stroke, Utah, 2001-2003, 2005 |
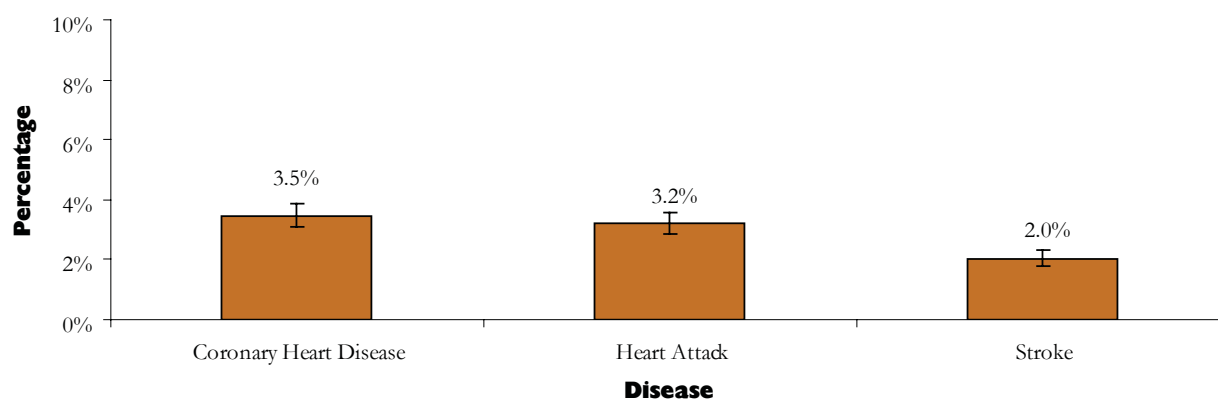
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population

Figure 4.1 | **Percentage of Adults Age 18 and Over Who Reported Having Coronary Heart Disease by Age and Gender, Utah, 2001-2003, 2005**
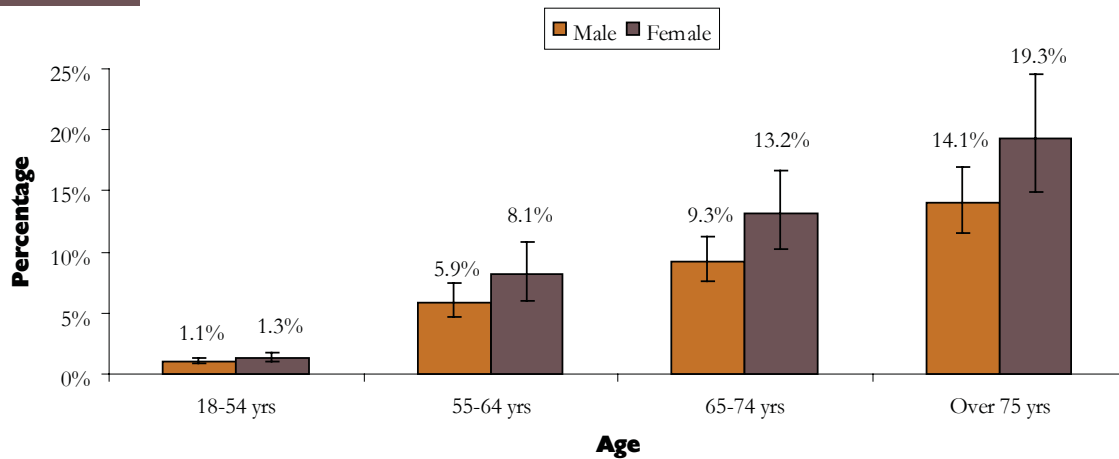
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

- Between 2001 and 2005, the age-adjusted percentage of Utah adults age 18 and over who reported ever having coronary heart disease or angina was 4.7% for males and 2.4% for females.

- The percentage of adults who reported having coronary heart disease or angina increased with age.

- Heart attacks were reported more commonly in males than females. Between 2001 and 2005, the age-adjusted percentage of Utah adults age 18 and over who reported ever having a heart attack was 4.7% for males and 2.0% for females.

- The percentage of adults who reported having a heart attack also increased with age.

Figure 4.2 | **Percentage of Adults Age 18 and Over Who Reported Having a Heart Attack by Age and Gender, Utah, 2001-2003, 2005**

Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

Figure 4.3   **Percentage of Adults Age 18 and Over Who Reported Having a Stroke by Age and Gender, Utah, 2001-2003, 2005**

Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

- The age-adjusted percentage of adults age 18 and over who reported ever experiencing a stroke was similar between males and females; the percentage was 2.0% for males and 2.1% for females between 2001 and 2005.

- The risk of having a stroke increased with age. Those age 75 and older had the highest stroke prevalence between 2001 and 2005, with 9.0% reporting they had experienced a stroke.

- Age-adjusted rates for coronary heart disease and heart attack were higher among White, non-Hispanic adults age 18 and over when compared to Hispanics.

Figure 4.4   **Percentage of Adults Age 18 and Over Who Reported Having Coronary Heart Disease, a Heart Attack or a Stroke by Ethnicity, Utah, 2001-2003, 2005**

Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population

Quality of Life and Disability

Why is it important?

Coronary heart disease and stroke are major causes of permanent disability among adults in the U.S. Stroke alone accounts for disability in about one million U.S. citizens.[1]

Who is at risk?

After an acute cardiovascular event, those with extensive injury to the heart or brain are at risk for permanent disability. Extent and timing of treatment also play a role in recovery. Other factors that can affect rehabilitation include the person's attitude, the extent of cooperation and support from family and friends, and the skill of the rehabilitation team working with the patient.[12]

How big is the problem in Utah?

- Between 2001 and 2005, more than 40% of Utah adults who reported having a heart attack, stroke, or coronary heart disease reported having fair or poor health.

- In Utah, 39.3% of adults who reported having had a stroke, 37.2% of adults who reported having had a heart attack, and 38.3% of adults who reported having had coronary heart disease also reported at least 7 days of poor physical health in the past month. Only 13.5% of the entire adult population between 2001 and 2005 reported poor physical health.

Figure 4.5 **Percentage of Adults Age 18 and Over Who Reported Fair or Poor Health by Disease Occurrence, Utah, 2001-2003, 2005**
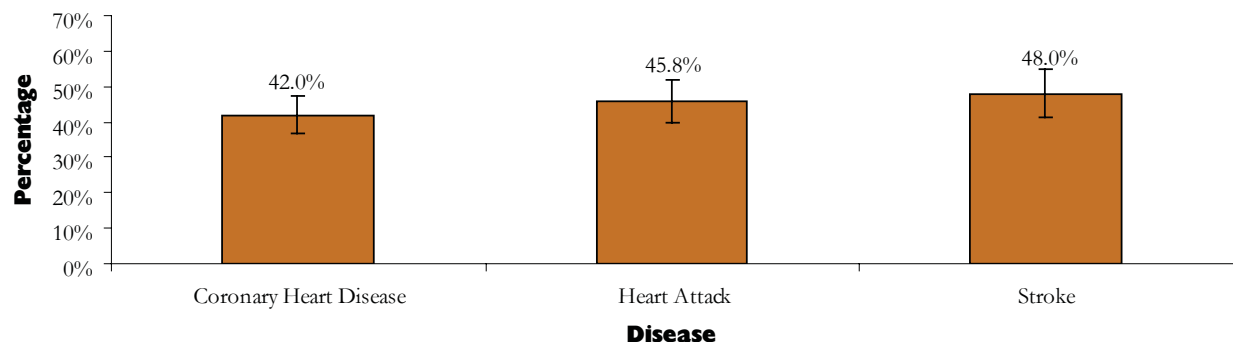
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

Figure 4.6 **Percentage of Adults Age 18 and Over Who Reported 7 or More Days of Poor Physical Health in the Last Month by Disease Occurrence, Utah, 2001-2003, 2005**
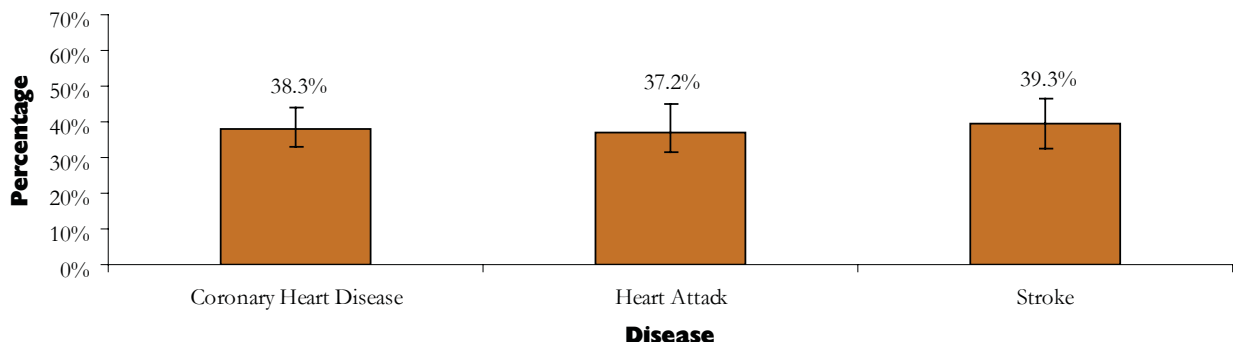
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

Figure 4.7 **Percentage of Adults Age 18 and Over Who Reported 7 or More Days of Poor Mental Health in the Last Month by Disease Occurrence, Utah, 2001-2003, 2005**
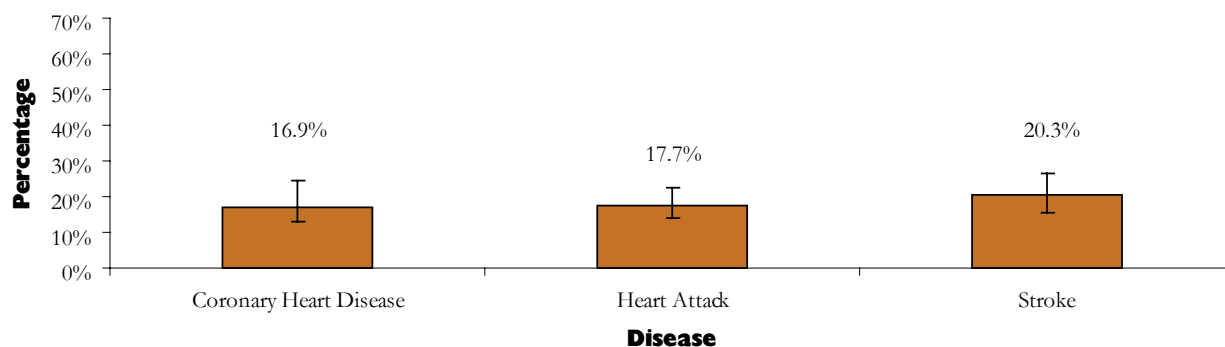
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

- The percentage of adults who reported 7 or more days of poor mental health among those who reported having a heart attack (17.7%), stroke (20.3%), or coronary heart disease (16.9%) was similar to the general adult population (15.6%) between 2001 and 2005.

- About half of Utahns between 2001 and 2005 who reported ever having a stroke, heart attack, or other coronary heart disease also reported being limited in their daily activities, compared to fewer than 20% of all adults in Utah.

Figure 4.8 **Percentage of Adults Age 18 and Over Who Reported Limitations in Their Activity by Disease Occurrence, Utah, 2001-2003, 2005**
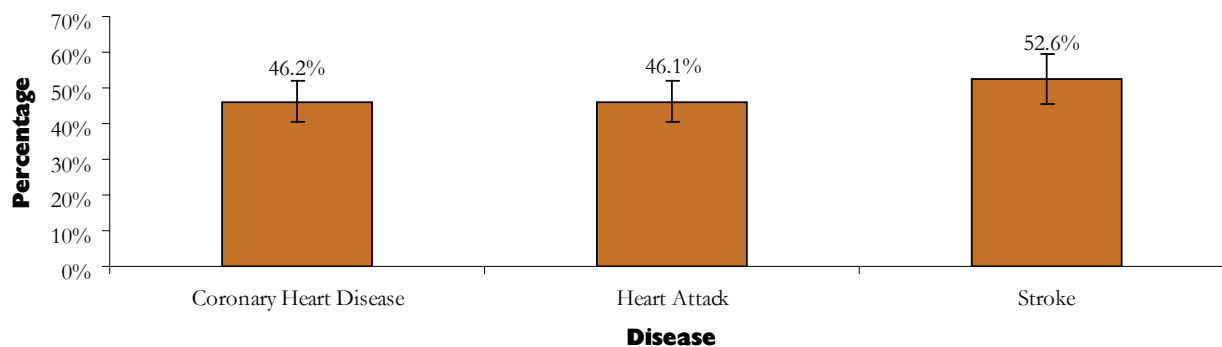
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

Rehabilitation

Why is it important?

Cardiac rehabilitation includes medical evaluation, a supervised exercise prescription, and CVD risk factor modification. In the U.S., persons who participated in cardiac rehabilitation following a heart attack had reduced risk of cardiac mortality, healthier eating habits, and lower smoking rates compared to persons who did not participate in cardiac rehabilitation programs.[19,20]

For stroke survivors, rehabilitation helps people relearn skills that are lost when part of the brain is damaged, and can also teach survivors new ways of accomplishing tasks to circumvent or compensate for disabilities that have occurred as a result of the stroke.

Who is at risk?

Many who could benefit from rehabilitation do not receive such services. Nationwide participation rates for eligible patients are low – between 10 percent and 20 percent.[20] Cardiac and stroke rehabilitation programs do not often exist in small communities, and when they are available, many people may not seek care or have adequate insurance to pay for such services.

How big is the problem in Utah?

- For those who reported ever having a heart attack, 21.7% reported participating in a rehabilitation program following the event.

- Only 16.4% of those who reported ever having a stroke reported participating in a rehabilitation program following the event.

- Although the numbers used to calculate the percentages were not large enough to show statistical significance, there was a notable difference in the percentage of adults who reported attending rehabilitation following a heart attack between rural and urban areas. The age-adjusted percentage of those who reported having a heart attack who lived in rural areas who also reported attending rehabilitation following the event (10.2%) was less than half the percentage for those living in urban areas (30.1%).

Figure 4.9 **Percentage of Adults Age 18 and Over Who Reported Attending Rehabilitation Following a Stroke or Heart Attack, Utah, 2001-2003, 2005**
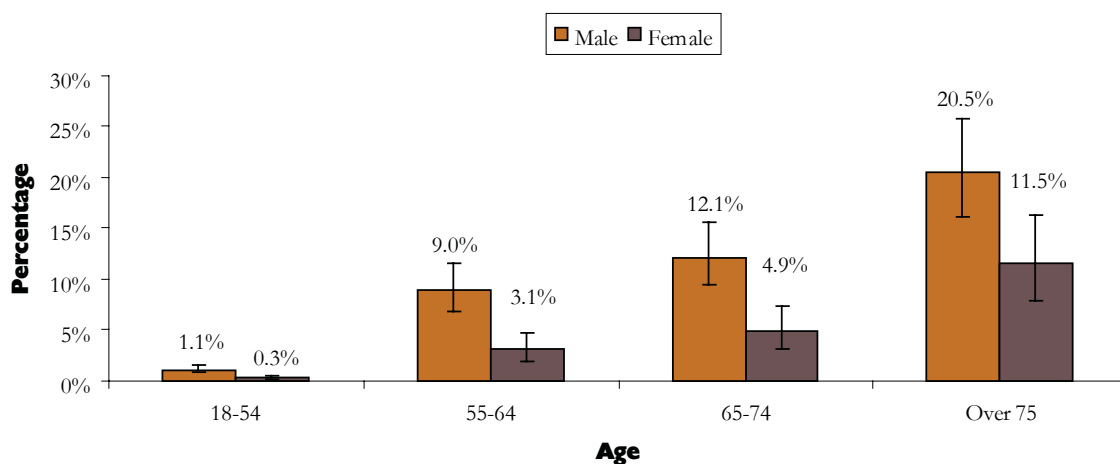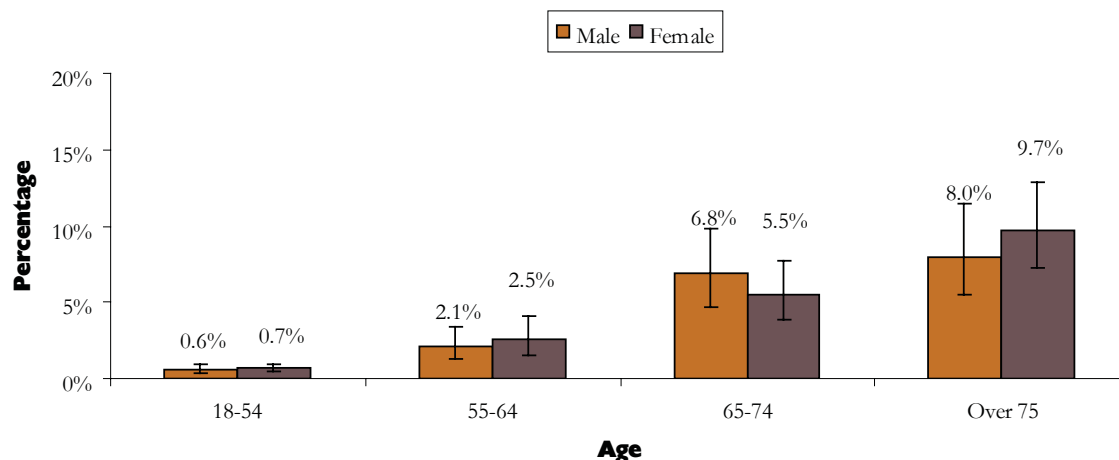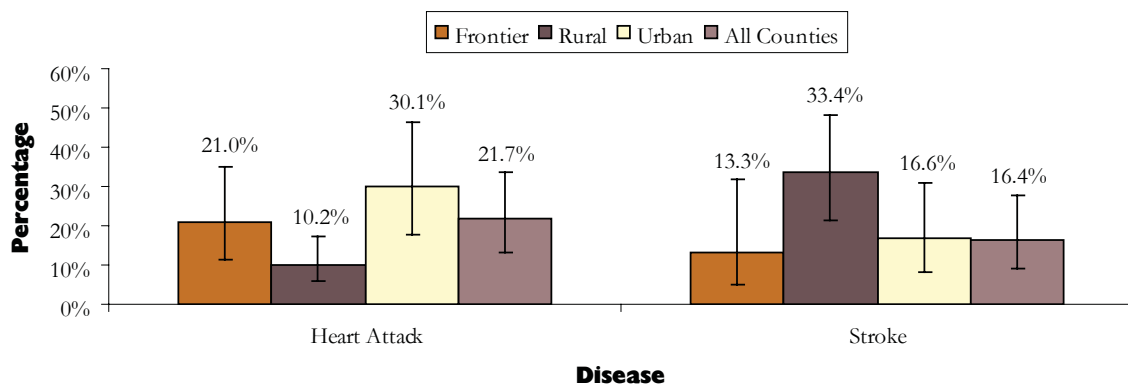

Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population

Implications

There are many individuals in Utah who have experienced heart attack or stroke and suffer disability. Many of those who have suffered a cardiovascular event have not benefited from rehabilitation services, particularly those residing in rural areas. Poor quality of life and premature death from CVD are occurring in many communities and across all ethnic groups in Utah. Public health efforts must be directed not only to reduce risk factors and cardiovascular events but must also encompass efforts to reduce disability and improve quality of life for those affected by CVD.

Chapter Five
Risk Factors

High Blood Pressure and Control

Why is it important?

Nearly one in every three adults in the U.S. has high blood pressure (hypertension). National surveys have found that only two-thirds of people with hypertension are aware of the diagnosis. Further, fewer than half are receiving treatment, and fewer than one-third have their blood pressure under control (i.e., a blood pressure measurement of less than 140/90 mmHg).[5] High blood pressure is often referred to as the "silent killer" due to its lack of symptoms and its insidious effects, which include increased risk of stroke, heart attack, and kidney failure. Blood pressure can easily be managed with several forms of medication, or by making lifestyle changes, such as losing weight and making dietary changes.

Who is at risk?

A number of modifiable factors can contribute to high blood pressure, including being overweight or obese, eating too much salt, excessive alcohol consumption, smoking, lack of physical activity and stress. Other factors include a family history of hypertension and increasing age. The prevalence of hypertension is much higher among Blacks than in other ethnic groups in the U.S. Severe complications from hypertension, such as stroke, also occur more frequently in Blacks than in other ethnic groups or races.[5]

How big is the problem in Utah?

*   In 2005, the age-adjusted rate of doctor-diagnosed high blood pressure reported by Utah adults was 21.5%. This was lower than the national rate of 25.7% for the same year.

*   Between 2001 and 2005, the age-adjusted rate of doctor-diagnosed high blood pressure among Utah adult males (23.3%) was higher than the rate for females (21.2%).

*   In Utah, the doctor-diagnosed high blood pressure rate was 11.9% for those age 18 to 54, 39.1% for those age 55 to 64, 51.9% for those age 65 to 74 and 50.0% for those age 75 and over.

*   Between 2001 and 2005, Hispanic persons of any race and non-Hispanic White persons had lower age-adjusted rates of high blood pressure (22.3% and 22.4% respectively) compared to all others (26.5%).

Figure 5.0 **Percentage of Adults Age 18 and Over Who Reported Having Doctor-diagnosed High Blood Pressure by Year, Utah and U.S., Odd Years 1995-2005**
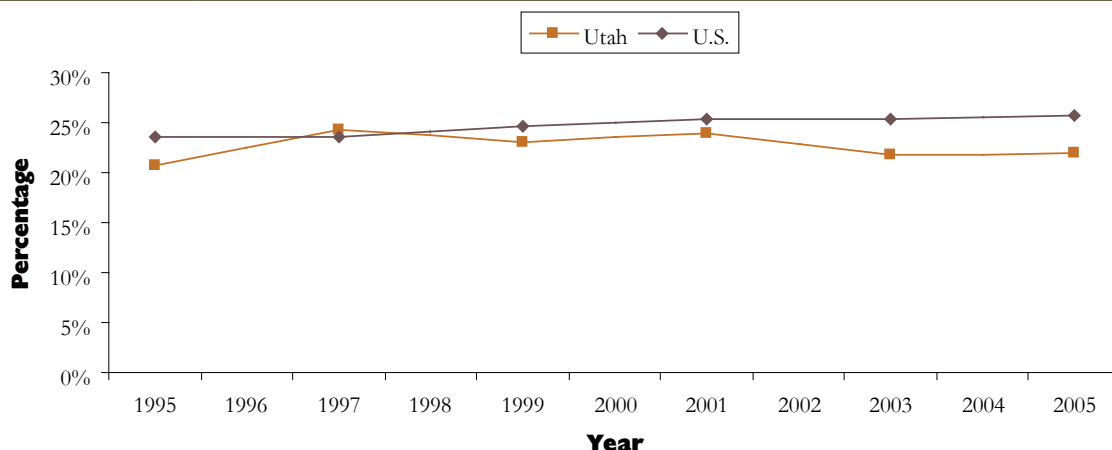
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population

Figure 5.1 **Percentage of Adults Age 18 and Over Who Reported Having Doctor-diagnosed High Blood Pressure by Age and Gender, Utah, 2001, 2003, 2005**
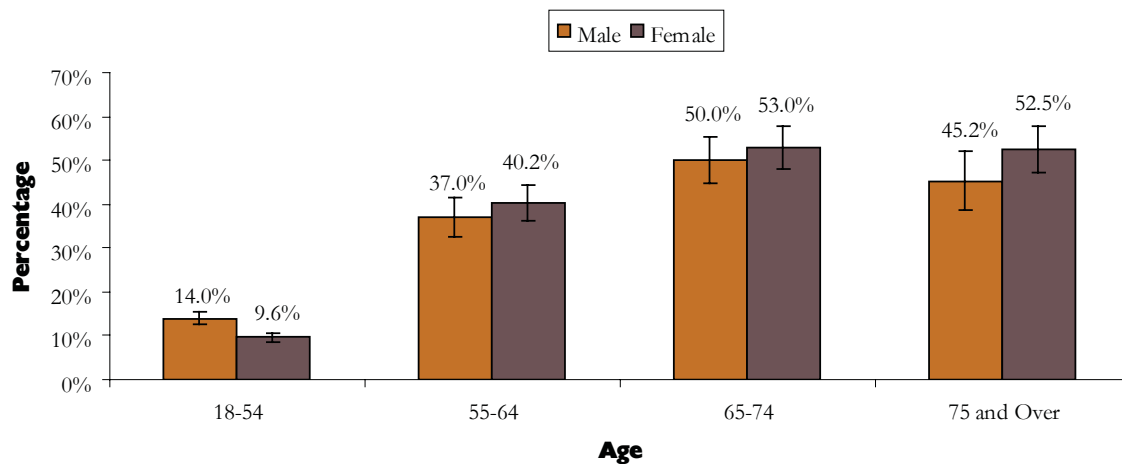
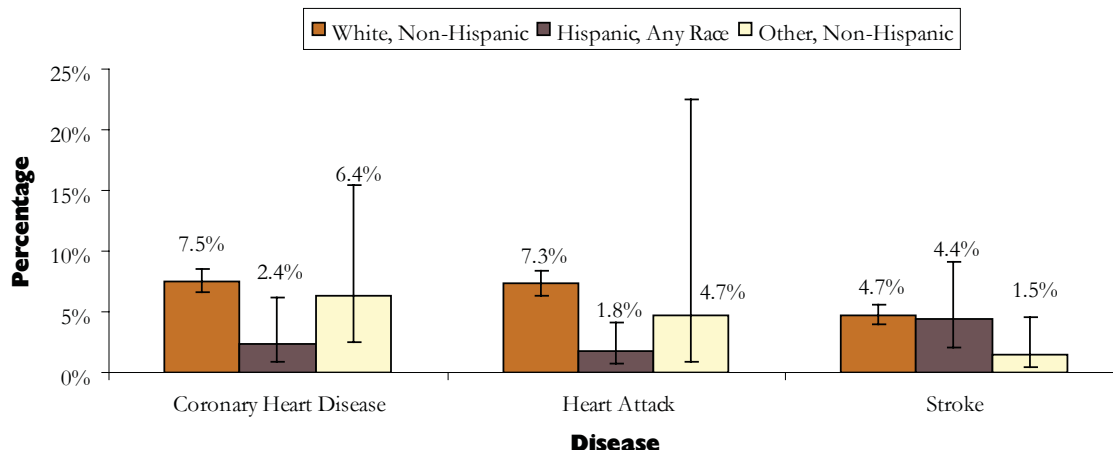Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

Table 5.2 **Percentage of Adults Age 18 and Over Who Reported Having Doctor-diagnosed High Blood Pressure by Demographic Characteristic, Utah, 2001, 2003, 2005**

	Utah Population		Doctor-diagnosed High Blood Pressure					
	Distribution	Number of Persons	Age-adjusted Rate	95% CI	Crude Rate	95% CI	Number With High Blood Pressure[1]	Distribution
All Utahns	100.0%	1,657,454	22.5%	(21.7-23.4)	19.8%	(18.9-20.6)	327,520	100.0%
Gender								
Male	49.9%	826,699	23.4%	(22.0-24.7)	20.3%	(19.0-21.7)	167,930	51.3%
Female	50.1%	830,755	21.2%	(20.2-22.4)	19.2%	(18.1-20.4)	159,680	48.7%
Age Group								
18-54	77.5%	1,285,171			11.9%	(11.1-12.8)	153,220	47.5%
55-64	10.2%	169,033			39.1%	(36.1-42.2)	66,070	20.5%
65-74	6.5%	107,232			51.9%	(48.3-55.4)	55,620	17.2%
75 and Over	5.8%	96,018			50.0%	(45.8-54.2)	47,970	14.9%
Race/Ethnicity								
White, Non-Hispanic	85.7%	1,420,118	22.4%	(21.5-23.3)	20.4%	(19.5-21.4)	290,310	89.2%
Hispanic, Any Race	9.2%	152,642	22.3%	(18.6-26.5)	13.0%	(10.4-16.1)	19,830	6.1%
Other, Non-Hispanic	5.1%	84,694	26.5%	(21.6-32.2)	18.0%	(13.9-23.0)	15,250	4.7%

1 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; ethnicity data derived using percentage of total population from 2003 Census Bureau Estimates; prevalence data from Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

Figure 5.3 Percentage of Adults Age 18 and Over Who Reported Being Under a Doctor's Care Among Those With Doctor-diagnosed High Blood Pressure by Age and Gender, Utah, 2003
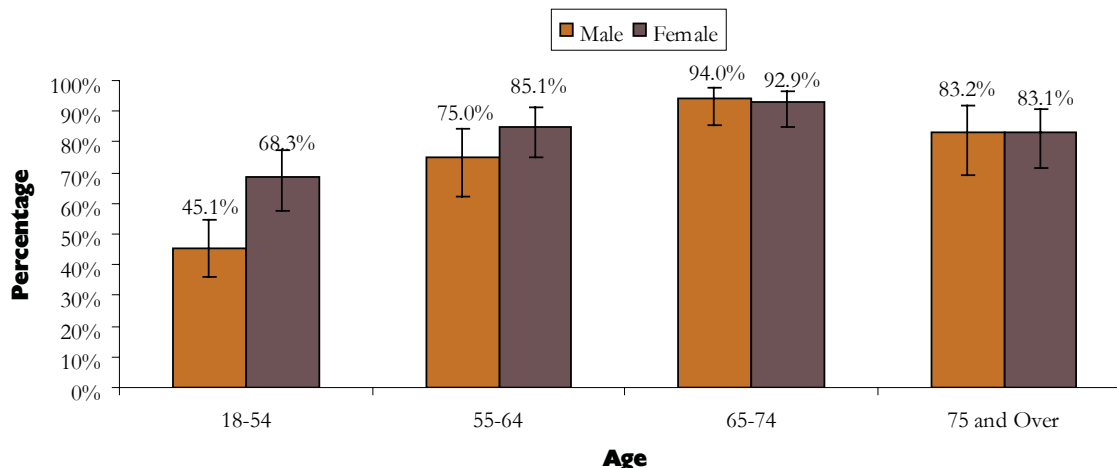
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population

- Males age 18 to 54 who reported having high blood pressure were less likely to report being under a doctor's care compared to females of the same age group. This disparity was not present in other age groups.

- The percentage of adults 18 and over who reported being under a doctor's care for high blood pressure was highest for those age 65 to 74 (93.4%).

- Among those with high blood pressure surveyed in 2005, 53.2% reported taking medication to control their high blood pressure, and 95.1% reported either changing their eating habits, reducing sodium intake, reducing alcohol intake, or increasing their level of physical activity.

Figure 5.4 Percentage of Adults Age 18 and Over Who Reported Taking Action to Control Their High Blood Pressure, Utah, 2005
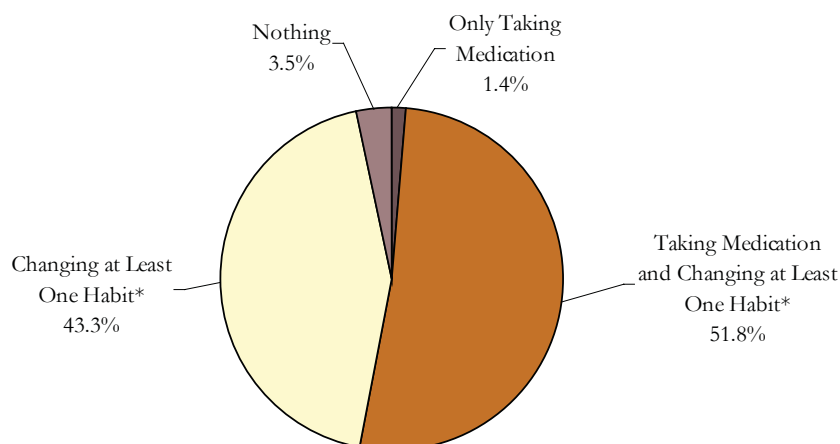
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population
*Habits include reducing alcohol intake, reducing salt intake, exercise, changing eating habits

Figure 5.5 **Percentage of Utah HMO Enrollees* With Hypertension Whose High Blood Pressure Was Under Control by Year, Weighted HEDIS, 1999-2005**
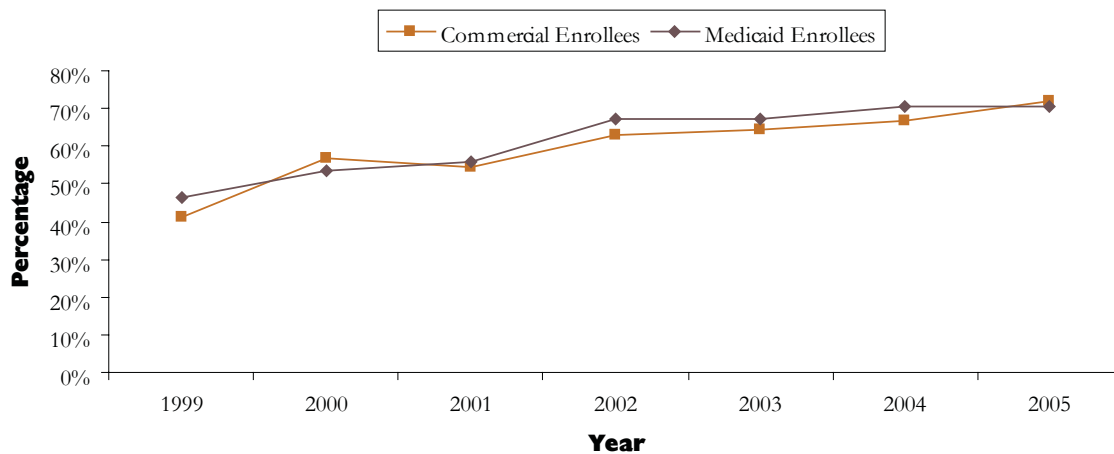
Source: Health Plan Employer Data and Information Set, Office of Health care Statistics, Utah Department of Health
*Data are representative of 38% of the insured population in Utah in 2006. 5 commercial plans and 2 medicaid plans reported data during the 7 year period.

- The percentage of Utah commercial HMO enrollees with hypertension whose blood pressure was under control increased from 41.4% in 1999 to 72.1% in 2005.

- The percentage of Utah Medicaid HMO enrollees with hypertension whose high blood pressure was under control increased from 46.5% in 1999 to 70.6% in 2005.

- The increase in these percentages can partially be attributed to the increase in documentation by physicians of blood pressure levels in hypertensive patients. In order to collect this data, chart reviews were conducted to extract actual blood pressure measurements. If a measurement was missing, a hypertensive patient was considered to not be controlling his or her high blood pressure.

High Blood Cholesterol and Control

Why is it important?

High levels of cholesterol in the blood can build up in the blood vessel walls, thus blocking blood flow to the heart, brain, and other important organs.[21] Treatment of high blood cholesterol leads to a lower risk of CVD.

Most people do not have any symptoms of high blood cholesterol. High blood cholesterol is diagnosed by checking blood levels of several important types of fat, including LDL cholesterol and triglycerides (see appendix).[21] Studies show those who have experienced a heart attack or stroke benefit from therapy to lower cholesterol.[22]

Who is at risk?

There are a number of factors that contribute to high blood cholesterol, including family history, diet, and physical inactivity. Other factors that contribute to high cholesterol include aging and being overweight. Younger women have lower levels of cholesterol than younger men, but the gender difference disappears after menopause. Research has also found that, compared to non-Hispanic Whites, Hispanic persons and Blacks are less likely to have their high cholesterol levels under control (total cholesterol level of 199 mg/dl or less).[23]

How big is the problem in Utah?

• In 2005, the age-adjusted rate of doctor-diagnosed high cholesterol reported by Utah adults was 24.9%. This was lower than the national rate of 26.6% for the same year.

• The age-adjusted rate of doctor-diagnosed high cholesterol reported by Utah adults increased by over 50% from 16.5% in 1995 to 24.9% in 2005.

• Between 2001 and 2005, the age-adjusted rate of doctor-diagnosed high cholesterol for Utah adult males (23.7%) was slightly greater than the rate for females (22.1%).

• Between 2001 and 2005, Utahns age 65 to 74 had the highest rate of high cholesterol (45.0%) compared to Utahns age 18 to 54 (14.1%) and those 75 years and older (35.1%).

• Non-Hispanic White adults had a higher age-adjusted rate of high cholesterol (23.3%) compared to Hispanic persons of any race (19.7%) and all others (17.4%) between 2001 and 2005. However, the sample surveyed was not large enough to show statistical significance.

Figure 5.6 Percentage of Adults Age 18 and Over Who Reported Having Doctor-diagnosed High Cholesterol by Year, Utah and U.S., Odd Years 1995-2005
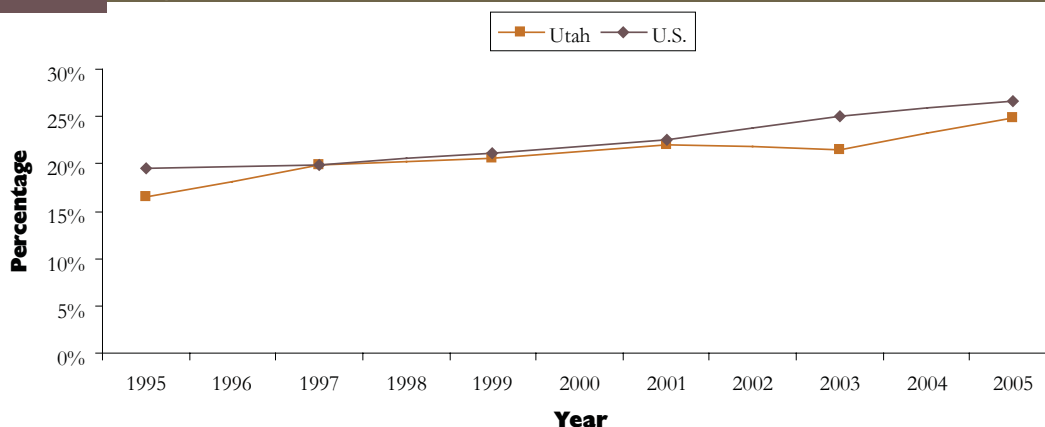
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population

Figure 5.7 | **Percentage of Adults Age 18 and Over Who Reported Having Doctor-diagnosed High Cholesterol by Age and Gender, Utah, 2001, 2003, 2005**
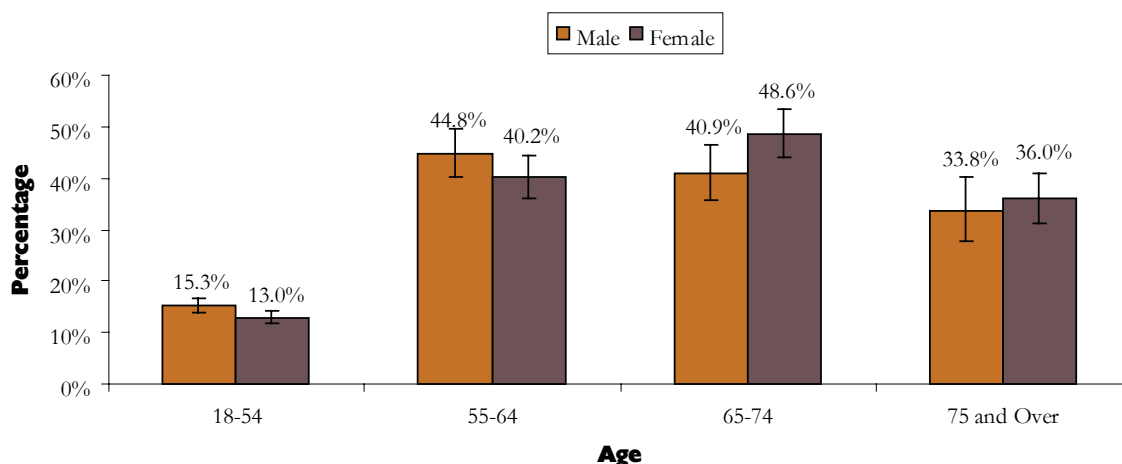
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

Table 5.8 | **Percentage of Adults Age 18 and Over Who Reported Having Doctor-diagnosed High Cholesterol by Demographic Characteristic, Utah, 2001, 2003, 2005**

	Utah Population		Doctor-diagnosed High Cholesterol					
	Distribution	Number of Persons	Age-adjusted Rate	95% CI	Crude Rate	95% CI	Number with High Cholesterol[1]	Distribution
All Utahns	100.0%	1,657,454	22.9%	(22.0-23.8)	20.6%	(19.7-21.5)	341,260	100.0%
Gender								
Male	49.9%	826,699	23.7%	(22.3-25.0)	20.9%	(19.6-22.2)	172,680	50.6%
Female	50.1%	830,755	22.1%	(20.9-23.2)	20.3%	(19.2-21.5)	168,630	49.4%
Age Group								
18-54	77.5%	1,285,171			14.1%	(13.2-15.0)	181,510	54.2%
55-64	10.2%	169,033			42.4%	(39.2-45.5)	71,610	21.4%
65-74	6.5%	107,232			45.0%	(41.4-48.6)	48,210	14.4%
75 and Over	5.8%	96,018			35.1%	(31.3-39.1)	33,690	10.1%
Race/Ethnicity								
White, Non-Hispanic	85.7%	1,420,118	23.3%	(22.4-24.3)	21.7%	(20.8-22.7)	308,400	91.6%
Hispanic, Any Race	9.2%	152,642	19.7%	(16.2-23.8)	13.0%	(10.4-16.0)	19,790	5.9%
Other, Non-Hispanic	5.1%	84,694	17.4%	(13.1-22.8)	9.8%	(7.1-13.5)	8,310	2.5%

1 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; ethnicity data derived using percentage of total population from 2003 Census Bureau Estimates; prevalence data from Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

Figure 5.9 **Percentage of Adults Age 18 and Over Who Reported Taking Action to Control Their High Cholesterol, Utah, 2001, 2003, 2005**

Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population

- Among those with high cholesterol between 2001 and 2005, 43.7% were under a doctor's care for their high blood cholesterol and 30.0% were taking medication to control their high cholesterol.

- A higher percentage of women reported being under a doctor's care for their high cholesterol compared to men. However, the percentage who reported taking medication to control their high cholesterol was similar between men and women.

- The percentage of commercial HMO enrollees whose blood cholesterol was under control following an acute cardiovascular event increased from 47.7% in 1999 to 65.1% in 2005.

- The percentage of Medicaid HMO enrollees whose blood cholesterol was under control following an acute cardiovascular event increased from 16.7% in 1999 to 26.0% in 2005.

Figure 5.10 **Percentage of Utah HMO Enrollees* Who Had an Acute Cardiovascular Event Whose Cholesterol Was Under Control by Year, Weighted HEDIS, 1999-2005**
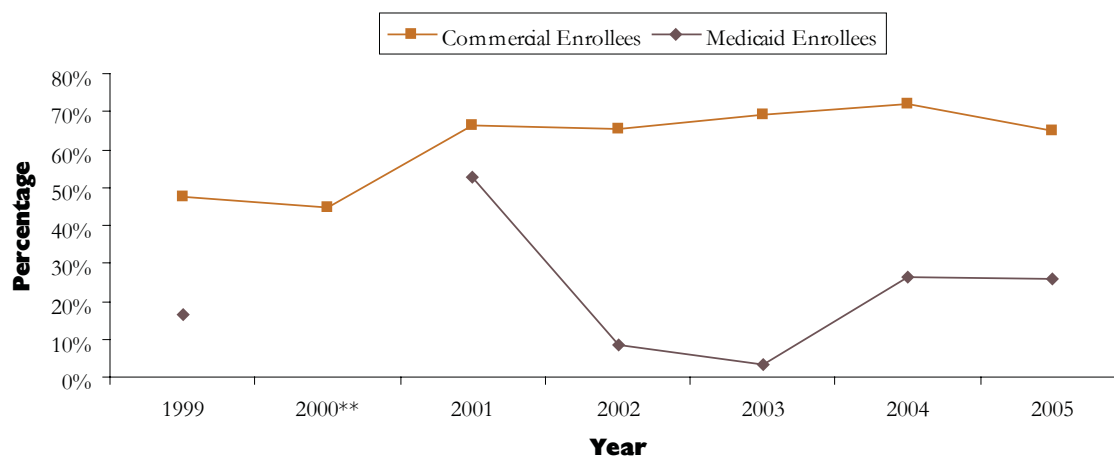
Source: Health Plan Employer Data and Information Set, Office of Health Care Statistics, Utah Department of Health
*Data are representative of 38% of the insured population in Utah in 2006. 5 commercial plans and 2 Medicaid plans reported data during the 7-year period.
**Insufficient Medicaid data were reported in 2000 to calculate a rate for this measure.

Smoking

Why is it important?

Smoking is a major preventable risk factor for CVD as well as for many cancers. Overall, smoking cigarettes results in a two to three-fold increased risk of dying from coronary heart disease. In addition, smoking is a powerful and independent predictor of sudden cardiac death in patients with coronary heart disease.[5]

On average, men who smoke die an average of more than 13 years earlier than men who do not smoke. Women who smoke die an average of 14 years earlier than non-smoking women. For non-smokers, it is estimated that more than 35,000 die each year from coronary heart disease as a result of exposure to secondhand smoke.[5]

Who is at risk?

The most significant risk factors for smoking are income and education. People with lower income levels report higher rates of smoking. Smoking prevalence among adults with less than a high school education is three times higher than among those with post-high school education.[24] Nearly 90% of persons who smoke have their first exposure to cigarettes before the age of 18. The average age when smokers first try cigarettes is 14.5 years. As many as 50% of young people who try cigarettes will become regular smokers.[25]

How big is the problem in Utah?

- In 2005, the age-adjusted smoking rate among Utah adults was 11.2%. This was lower than the national rate of 20.5% for the same year.

- The age-adjusted smoking rate among Utah adults decreased from 15.2% in 1996 to 11.2% in 2005.

- Between 2001 and 2005, the age-adjusted smoking rate among Utah adult males (13.1%) was higher than the rate for females (10.3%).

- The adult smoking rate decreased with age between 2001 and 2005, and was highest for those age 18 to 54 (13.5%), and lowest for those age 75 and over (3.0%).

- Between 2001 and 2005, non-Hispanic Whites had a lower age-adjusted smoking rate (11.5%) compared to all other non-Hispanic races (17.1%).

Figure 5.11 **Percentage of Adults Age 18 and Over Who Reported Being Current Smokers* by Year, Utah and U.S., 1996-2005**
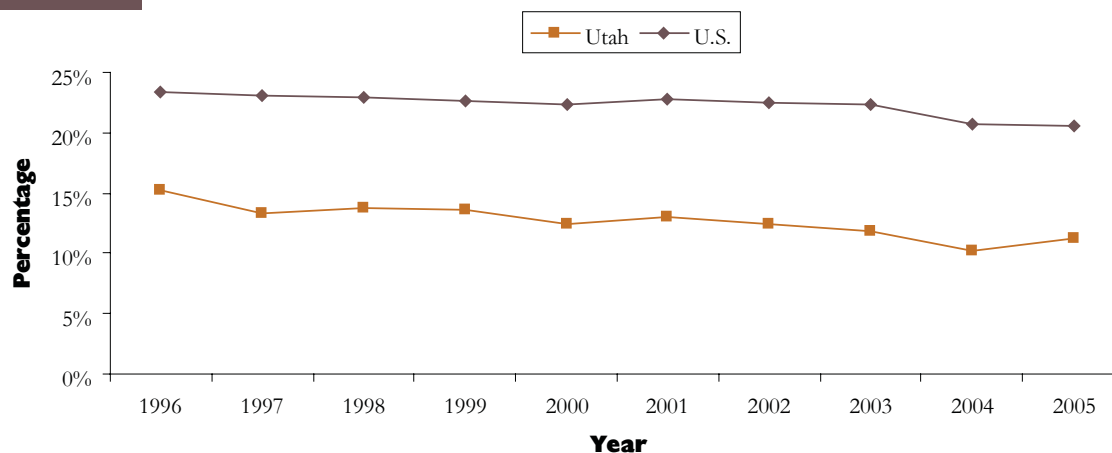
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population
*Current smoking is defined as persons who reported smoking 100 cigarettes in their lifetime who also report smoking some days or every day

Figure 5.12 **Percentage of Adults Age 18 and Over Who Reported Being Current Smokers* by Age and Gender, Utah, 2001-2005**
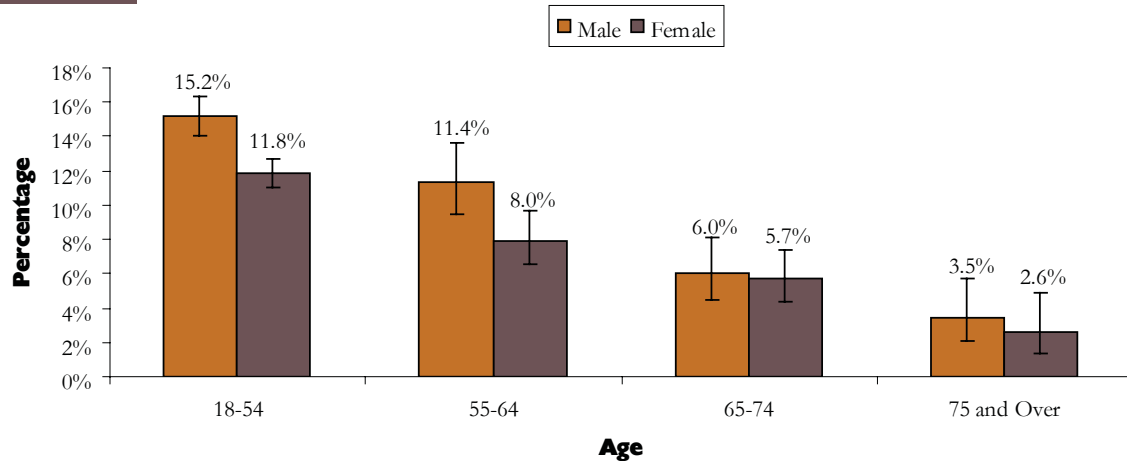
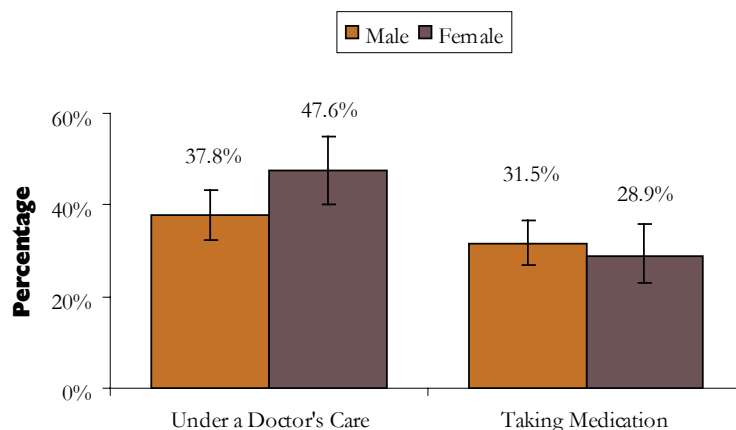Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
*Current smoking is defined as persons who reported smoking 100 cigarettes in their lifetime who also report smoking some days or every day

Table 5.13 **Percentage of Adults Age 18 and Over Who Reported Being Current Smokers* by Demographic Characteristic, Utah, 2001-2005**

	Utah Population		Current Smoking					
	Distribution	Number of Persons	Age-adjusted Rate	95% CI	Crude Rate	95% CI	Number Who Smoke[1]	Distribution
All Utahns	100.0%	1,657,454	11.7%	(11.2-12.2)	11.9%	(11.4-12.5)	197,790	100.0%
Gender								
Male	49.9%	826,699	13.1%	(12.2-13.9)	13.6%	(12.7-14.5)	112,250	56.7%
Female	50.1%	830,755	10.3%	(9.7-11.0)	10.3%	(9.7-11.0)	85,810	43.3%
Age Group								
18-54	77.5%	1,285,171			13.5%	(12.8-14.2)	173,720	87.3%
55-64	10.2%	169,033			9.6%	(8.4-11.0)	16,210	8.1%
65-74	6.5%	107,232			5.8%	(4.8-7.1)	6,260	3.1%
75 and Over	5.8%	96,018			3.0%	(1.9-4.5)	2,830	1.4%
Race/Ethnicity								
White, Non-Hispanic	85.7%	1,420,118	11.5%	(10.9-12.0)	11.6%	(11.0-12.2)	164,920	82.7%
Hispanic, Any Race	9.2%	152,642	12.6%	(10.5-15.0)	12.5%	(10.4-14.9)	19,060	9.6%
Other, Non-Hispanic	5.1%	84,694	17.1%	(13.9-20.8)	18.1%	(14.6-22.2)	15,340	7.7%

1 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; ethnicity data derived using percentage of total population from 2003 Census Bureau Estimates; prevalence data from Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

*Current smoking is defined as persons who reported smoking 100 cigarettes in their lifetime who also report smoking some days or every day

Diabetes

Why is it important?

Diabetes is considered a risk equivalent for coronary heart disease. That means that a person with diabetes has the same risk of a heart attack as someone who has already had a heart attack.[26] Diabetes prevalence increased about 54 percent in the U.S. between 1994 and 2002.[27] Women with diabetes have at least twice the prevalence of CVD compared to women without diabetes. Additionally, it is estimated that about one-third of diabetes cases are undiagnosed.

Who is at risk?

About 70 percent of the risk of diabetes in the U.S. can be attributed to excess body weight.[5] Among minorities, American Indians have the highest rates of diabetes in the U.S., with rates at least three times higher than Whites of the same age. Blacks and Hispanic persons are also at higher risk for developing diabetes. Other factors that increase risk for diabetes include increasing age and a family history of diabetes.

How big is the problem in Utah?

- In 2005, the age-adjusted rate of diagnosed diabetes in Utah adults was 6.5%. This was lower than the national rate of 7.6% for adults in the same year.

- The age-adjusted rate of diabetes among Utah adults nearly doubled between 1996 and 2005, from 3.7% to 6.5%.

- Between 2001 and 2005, the age-adjusted rate of diabetes among Utah adult males (6.3%) was higher than the rate for females (5.2%).

- Between 2001 and 2005, Utahns age 65 and over reported higher rates of diabetes compared to those under age 65.

- Between 2001 and 2005, non-Hispanic White Utah adults had a lower age-adjusted prevalence rate of diabetes (5.4%) compared to Hispanic persons of any race (8.8%) and all others (8.8%).

Figure 5.14 Percentage of Adults Age 18 and Over Who Reported Having Diabetes by Year, Utah and U.S., 1996-2005
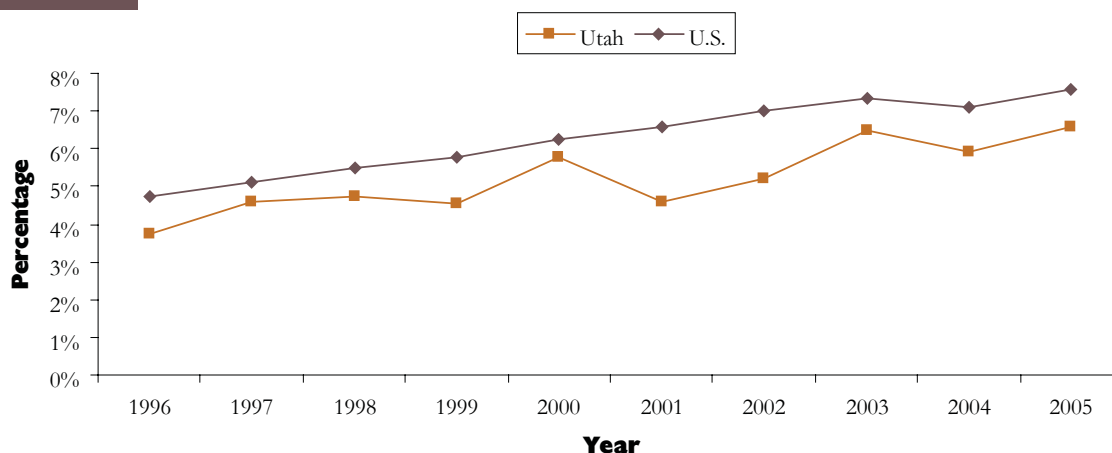
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population

Figure 5.15 **Percentage of Adults Age 18 and Over Who Reported Having Diabetes by Age and Gender, Utah 2001-2005**
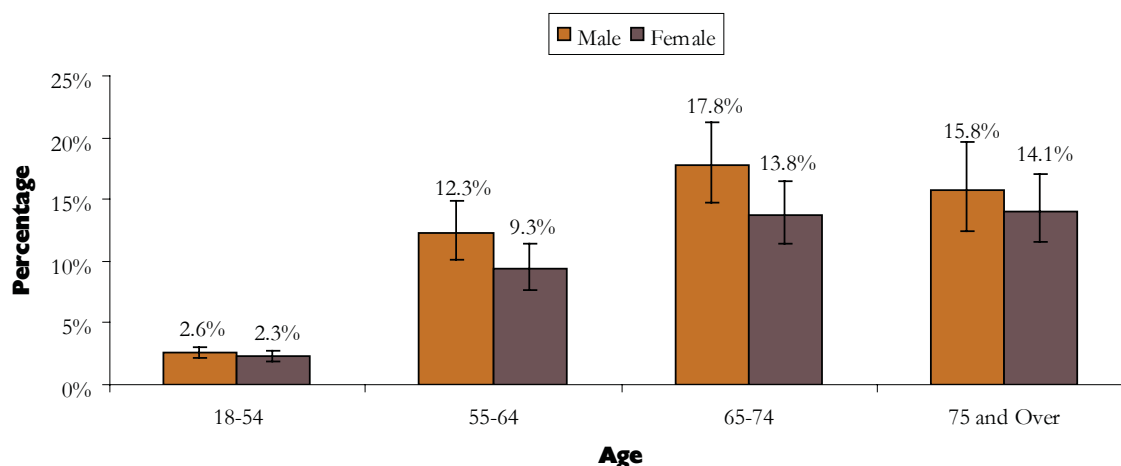
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

Table 5.16 **Percentage of Adults Age 18 and Over Who Reported Having Diabetes by Demographic Characteristic, Utah, 2001-2005**

	Utah Population		Diabetes					
	Distribution	Number of Persons	Age-adjusted Rate	95% CI	Crude Rate	95% CI	Number With Diabetes[1]	Distribution
All Utahns	100.0%	1,657,454	5.8%	(5.4-6.2)	5.0%	(4.6-5.3)	82,390	100.0%
Gender								
Male	49.9%	826,699	6.3%	(5.7-6.9)	5.2%	(4.7-5.8)	43,030	52.2%
Female	50.1%	830,755	5.2%	(4.8-5.8)	4.7%	(4.3-5.2)	39,390	47.8%
Age Group								
18-54	77.5%	1,285,171			2.5%	(2.2-2.8)	31,560	39.1%
55-64	10.2%	169,033			10.7%	(9.4-12.3)	18,160	22.5%
65-74	6.5%	107,232			15.6%	(13.7-17.7)	16,750	20.8%
75 and Over	5.8%	96,018			14.8%	(12.7-17.1)	14,190	17.6%
Race/Ethnicity								
White, non-Hispanic	85.7%	1,420,118	5.4%	(5.0-5.8)	4.9%	(4.5-5.2)	69,070	83.6%
Hispanic, Any Race	9.2%	152,642	8.8%	(6.8-11.3)	4.9%	(3.7-6.5)	7,510	9.1%
Other, non-Hispanic	5.1%	84,694	8.8%	(6.2-12.3)	7.1%	(4.7-10.7)	6,040	7.3%

1 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; ethnicity data derived using percentage of total population from 2003 Census Bureau Estimates; prevalence data from Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

Figure 5.17 Percentage of Adults Age 18 and Over Who Reported Having Diabetes by Comorbidity, Utah, 2001-2003, 2005
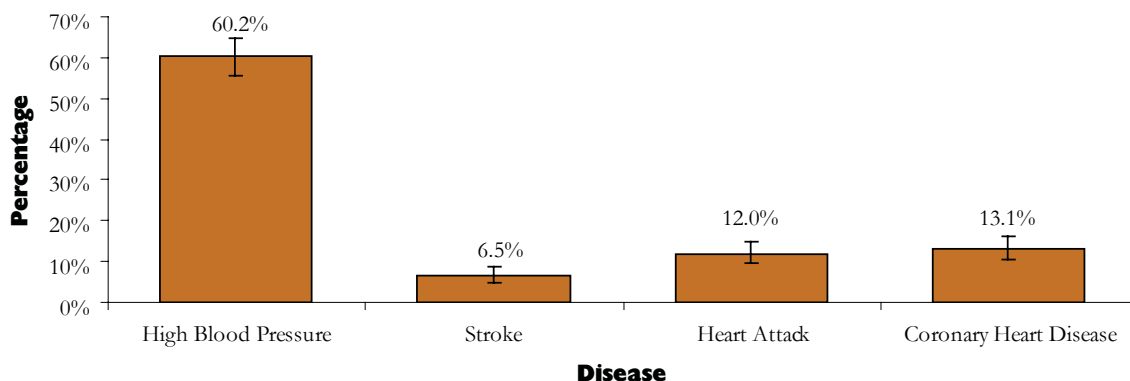
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

- Among Utah adults who reported having diabetes, 60.2% reported being told by a doctor that they had high blood pressure, 6.5% reported having a stroke, 12.0% reported having a heart attack, and 13.1% reported being told by a doctor that they had coronary heart disease.

Inadequate Physical Activity

Why is it important?

A lack of physical activity increases the risk for both CVD and type 2 diabetes. Physical inactivity enhances the severity of other cardiovascular risk factors, including hypertension and high cholesterol. It has also been shown to be an independent risk factor for CVD.[28] In general, a person should participate in at least 30 minutes of moderate activity at least five days a week, or 20 minutes of vigorous activity at least three days a week in order to meet current physical activity recommendations.

Who is at risk?

Women are more likely to be physically active than men. Decreased physical activity and increased screen time, whether viewing television or computer screens, are widespread among youth. Unhealthy habits among youth carry over into adulthood and can increase the risk for CVD.[29]

How big is the problem in Utah?

- In 2005, the age-adjusted rate of Utah adults who did not meet the recommendation for physical activity was 46.2%. This was lower than the national rate of 51.9% for adults in the same year.

- Between 2001 and 2005, the age-adjusted rate of Utah adults who did not meet the recommendation for physical activity was slightly higher for males (46.1%) when compared to females (45.7%).

- Between 2001 and 2005, the rate of Utah adults who did not meet the recommendation for physical activity increased with age. The rate was lowest for those age 18 to 54 (42.3%), and highest for those age 75 and over (64.4%).

- Between 2001 and 2005, non-Hispanic Whites had a lower age-adjusted rate of adults who did not meet the recommendation for physical activity (45.2%) compared to Hispanic persons of any race (54.9%).

Figure 5.18 Percentage of Adults Age 18 and Over Who Reported Not Getting the Recommended Amount of Physical Activity* by Year, Utah and U.S., 2001, 2003, 2005
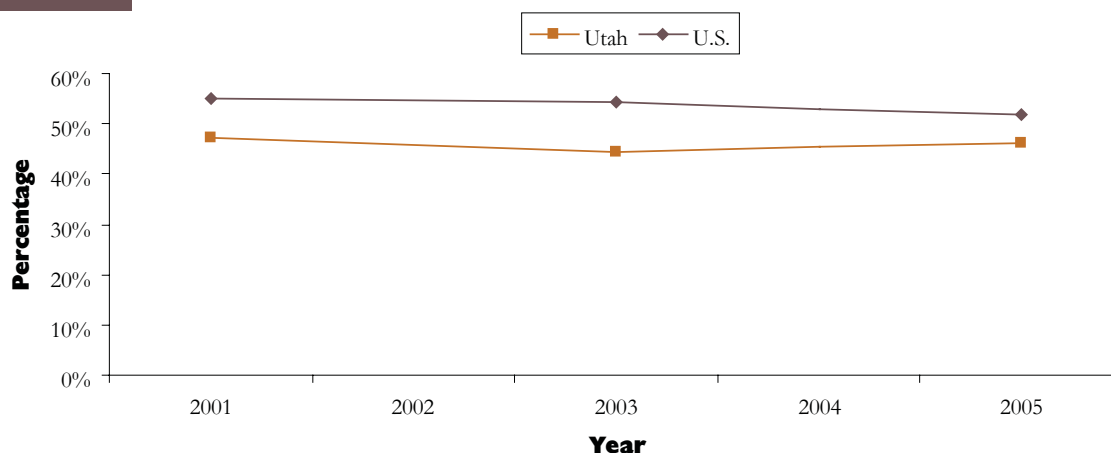
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population
*A person is considered to be meeting the recommendation if he or she participates in at least 30 minutes of moderate activity at least five days a week or in 20 minutes of vigorous activity at least three days a week.

Figure 5.19 Percentage of Adults Age 18 and Over Who Reported Not Getting the Recommended Amount of Physical Activity* by Age and Gender, Utah, 2001, 2003, 2005
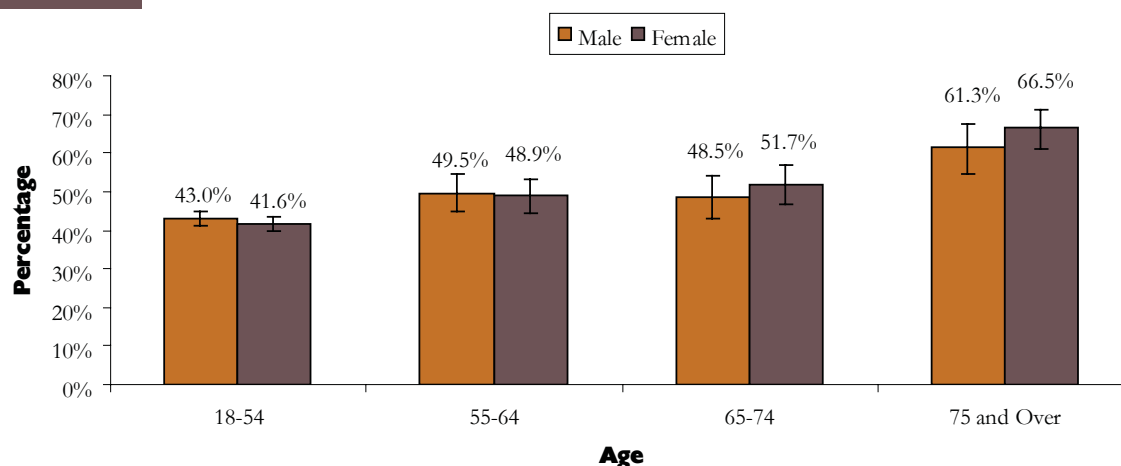
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
*A person is considered to be meeting the recommendation if he or she participates in at least 30 minutes of moderate activity at least five days a week or in 20 minutes of vigorous activity at least three days a week.

Table 5.20 Percentage of Adults Age 18 and Over Who Reported Not Getting the Recommended Amount of Physical Activity* by Demographic Characteristic, Utah, 2001, 2003, 2005

| | Utah Population | | Not Meeting Recommendation for Physical Activity | | | | | |
	Distribution	Number of Persons	Age-adjusted Rate	95% CI	Crude Rate	95% CI	Number of Persons[1]	Distribution
All Utahns	100.0%	1,657,454	45.9%	(44.8-47.1)	44.7%	(43.5-45.9)	741,160	100.0%
Gender								
Male	49.9%	826,699	46.1%	(44.4-47.8)	44.8%	(43.0-46.6)	370,280	50.0%
Female	50.1%	830,755	45.7%	(44.2-47.2)	44.6%	(43.1-46.2)	370,890	50.0%
Age Group								
18-54	77.5%	1,285,171			42.3%	(40.9-43.9)	543,800	73.2%
55-64	10.2%	169,033			49.2%	(46.0-52.5)	83,190	11.2%
65-74	6.5%	107,232			50.2%	(46.4-53.9)	53,810	7.2%
75 and Over	5.8%	96,018			64.4%	(60.2-68.3)	61,810	8.3%
Race/Ethncity								
White, Non-Hispanic	85.7%	1,420,118	45.2%	(44.0-46.4)	44.2%	(42.9-45.4)	627,120	84.4%
Hispanic, Any Race	9.2%	152,642	54.9%	(50.2-59.5)	51.4%	(46.5-56.3)	78,480	10.6%
Other, Non-Hispanic	5.1%	84,694	49.0%	(42.7-55.3)	43.7%	(37.3-50.3)	37,030	5.0%

1 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; ethnicity data derived using percentage of total population from 2003 Census Bureau Estimates; prevalence data from Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

*A person is considered to be meeting the recommendation if he or she participates in at least 30 minutes of moderate activity at least five days a week or in 20 minutes of vigorous activity at least three days a week.

Obesity

Why is it important?

Excess body fat alone is a risk factor for CVD. But hypertension, diabetes, and high blood cholesterol often occur along with obesity. The presence of multiple risk factors compounds the risk of CVD.[29] Increasing rates of obesity in the U.S. have the potential to increase the prevalence of CVD. Even relatively small amounts of excess body weight in midlife have been found to be associated with increased risk of death.[30]

Who is at risk?

The increasing prevalence of overweight and obesity is attributable to decreasing levels of physical activity and dietary changes, including higher consumption of high-fat foods and a decrease in consumption of fruits and vegetables.

How big is the problem in Utah?

- In 2005, the age-adjusted percentage of Utah adults who were classified as overweight or obese was 58.2%. This was slightly less than the national percentage, which was 61.1% for the same year.

- The age-adjusted rate of overweight or obesity among Utah adults increased from 49.0% in 1996 to 58.2% in 2005.

- Between 2001 and 2005, adult Utahns age 55 to 74 had a higher age-adjusted percentage adults classified as overweight or obese compared to those age 18 to 54 and those age 75 and over.

- Non-Hispanic White Utahns had a lower age-adjusted rate of overweight or obesity (56.3%) compared to Hispanic persons of any race (64.0%) between 2001 and 2005.

| Figure 5.21 | Percentage of Adults Age 18 and Over Classified as Overweight or Obese* by Year, Utah and U.S., 1996-2005 |
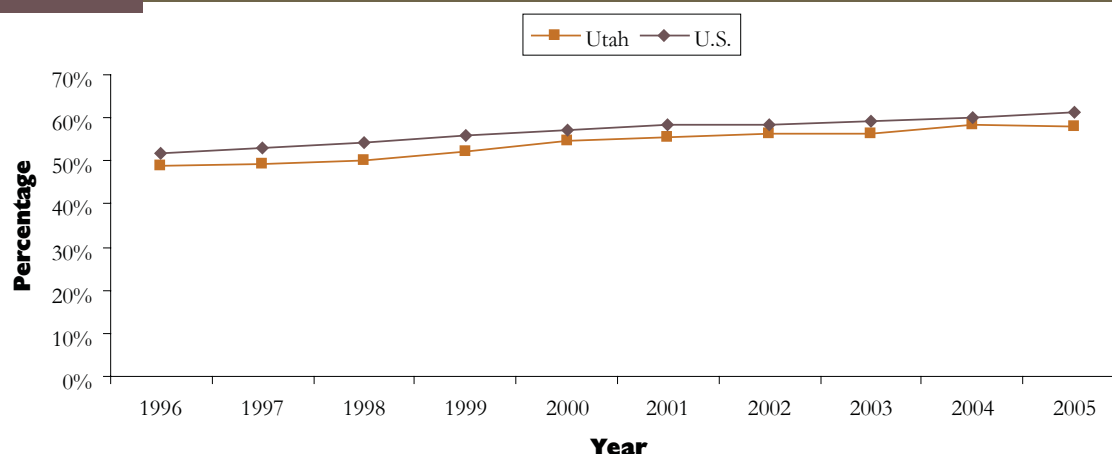
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
Age-adjusted to 2000 U.S. standard population
* Persons with a BMI of 25 or higher

Figure 5.22 **Percentage of Adults Age 18 and Over Classified as Overweight or Obese* by Age and Gender, Utah, 2001-2005**
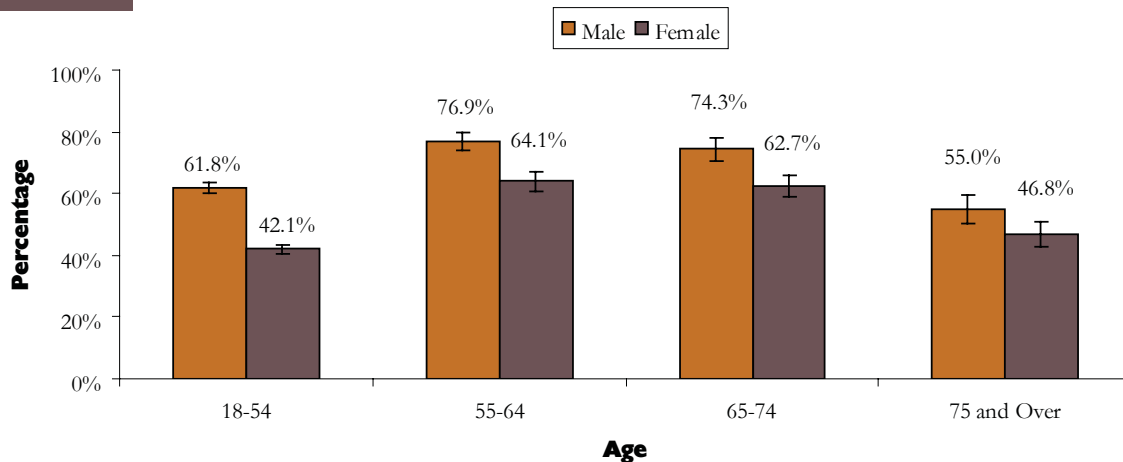
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
* Persons with a BMI of 25 or higher

Table 5.23 **Percentage of Adults Age 18 and Over Classified as Overweight or Obese by Demographic Characteristic, Utah, 2001-2005**

	Utah Population		Overweight/Obesity					
	Distribution	Number of Persons	Age-adjusted Rate	95% CI	Crude Rate	95% CI	Number Who are Overweight or Obese[1]	Distribution
All Utahns	100.0%	1,657,454	57.0%	(56.1-57.8)	55.2%	(54.3-56.1)	914,210	100.0%
Gender								
Male	49.9%	826,699	65.5%	(64.3-66.7)	63.9%	(62.6-65.1)	527,930	57.9%
Female	50.1%	830,755	48.1%	(47.0-49.3)	46.3%	(45.1-47.5)	384,420	42.1%
Age Group								
18-54	77.5%	1,285,171			52.2%	(51.2-53.3)	671,430	73.6%
55-64	10.2%	169,033			70.4%	(68.2-72.5)	119,030	13.1%
65-74	6.5%	107,232			68.3%	(65.7-70.8)	73,200	8.0%
75 and Over	5.8%	96,018			50.3%	(47.1-53.4)	48,250	5.3%
Race/Ethnicity								
White, Non-Hispanic	85.7%	1,420,118	56.3%	(55.4-57.2)	54.7%	(53.8-55.6)	776,730	84.7%
Hispanic, Any Race	9.2%	152,642	64.0%	(60.1-67.7)	61.3%	(57.3-65.2)	93,620	10.2%
Other, Non-Hispanic	5.1%	84,694	57.4%	(52.6-62.1)	55.4%	(50.3-60.4)	46,950	5.1%

1 Calculated by multiplying the crude rate by the number of persons in the demographic subgroup, rounded to the nearest 10 persons. Numbers may not sum to total because of missing values when grouping variables.

Population counts from 2003 Governor's Office of Planning and Budget Population Estimates; ethnicity data derived using percentage of total population from 2003 Census Bureau Estimates; prevalence data from Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health

* Persons with a BMI of 25 or higher

Multiple Risk Factors

Why is it important?

The overall risk for CVD increases with the total number of risk factors.[11] Although risk factors such as age, race and family history cannot be changed, other important risk factors such as smoking and physical inactivity can be modified. Several risk factors such as diabetes and hypertension tend to occur in the same person. Metabolic syndrome is a new diagnosis for people with several important modifiable risk factors for CVD, including abdominal obesity, abnormal lipids, high blood sugar, and hypertension.[31] Overall, the total burden of cardiovascular risk factors in Utah is high, with nearly 20 percent of adults reporting three or more risk factors.

Who is at risk?

Risk factors for heart disease are often associated with other co-morbidities. Lack of physical activity accompanied by poor nutrition can lead to obesity. Obesity is associated with the development of type 2 diabetes and hypertension. Risk for CVD is substantially increased with multiple risk factors.[11] Those with less education and lower income have higher prevalence of multiple risk factors when compared to the general population. Racial minority groups such as Blacks and Native Americans also have a higher prevalence of multiple risk factors.

How big is the problem in Utah?

- Between 2001 and 2005, 79.4% of Utah adults had at least one of six major risk factors for CVD (i.e., high blood pressure, high blood cholesterol, smoking, diabetes, inadequate physical activity, and being overweight or obese), and nearly half (46.8%) had two or more risk factors.

Figure 5.24   **Distribution of Cardiovascular Disease Risk Factors* Among Adults Age 18 and Over, Utah, 2001, 2003, 2005**
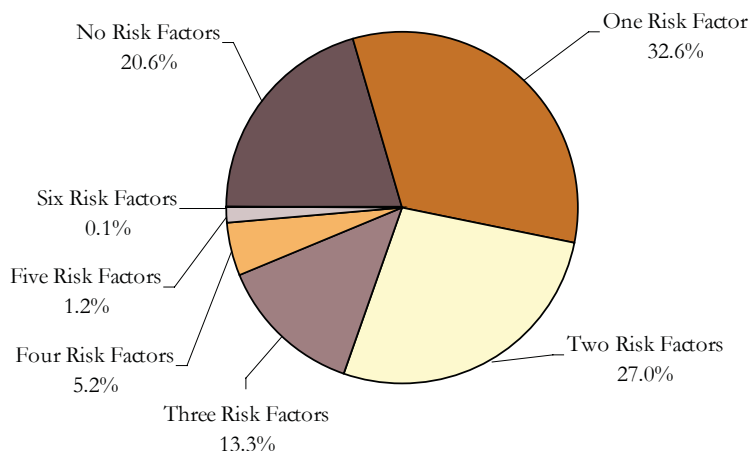
No Risk Factors 20.6%
One Risk Factor 32.6%
Six Risk Factors 0.1%
Five Risk Factors 1.2%
Four Risk Factors 5.2%
Three Risk Factors 13.3%
Two Risk Factors 27.0%

Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
* Risk factors include high blood pressure, high cholesterol, smoking, diabetes, inadequate physical activity, and being overweight or obese

Figure 5.25 **Percentage of Adults Age 18 and Over Who Reported Fair or Poor Health by Number of Cardiovascular Disease Risk Factors*, Utah, 2001, 2003, 2005**
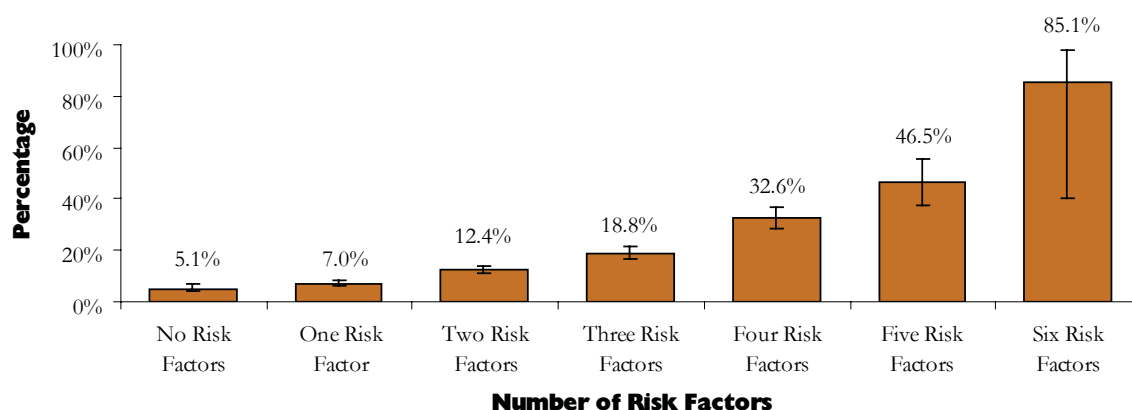
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
* Risk factors include high blood pressure, high cholesterol, smoking, diabetes, inadequate physical activity, and being overweight or obese

- The percentage of adults 18 and over who reported having fair or poor health increased from 5.1% among those with no risk factors to 85.1% among those with six risk factors between 2001 and 2005.

- The average number of days in a month that a person reported poor physical health between 2001 and 2005 increased from 2.8 days among those with no risk factors to 10.1 days among those with at least five risk factors.

Figure 5.26 **Average Number of Poor Physical Health Days in the Past Month by Number of Cardiovascular Disease Risk Factors*, Utah, 2001, 2003, 2005**
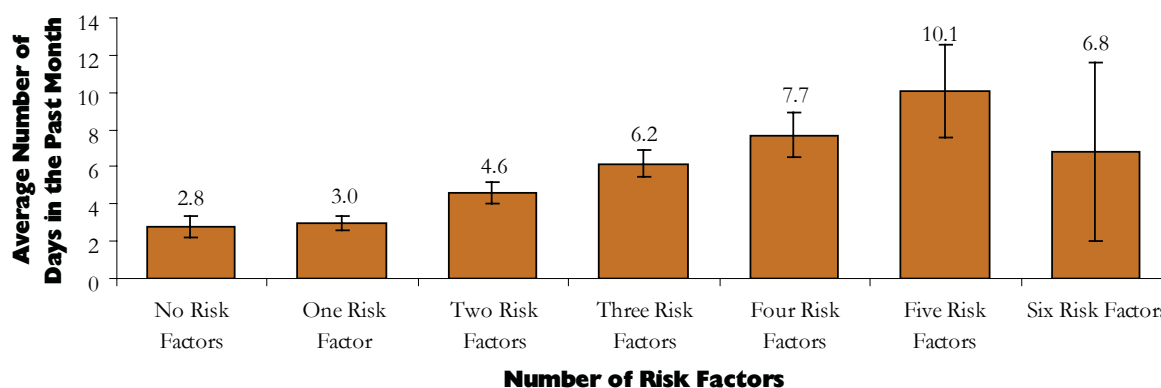
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
* Risk factors include high blood pressure, high cholesterol, smoking, diabetes, inadequate physical activity, and being overweight or obese

Figure 5.27 **Average Number of Poor Mental Health Days in the Past Month by Number of Cardiovascular Disease Risk Factors*, Utah, 2001, 2003, 2005**
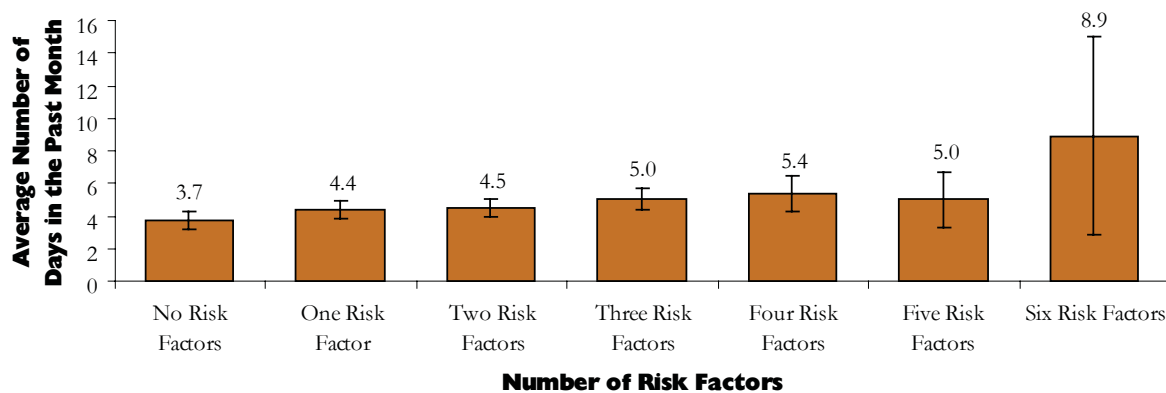
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
* Risk factors include high blood pressure, high cholesterol, smoking, diabetes, inadequate physical activity, and being overweight or obese

- The average number of poor mental health days in the last month reported by adults 18 and over did not increase by number of CVD risk factors reported, except for those with 6 risk factors.

- The percentage of adults who reported limitations in their activity increased from 10.5% in adults 18 and over with no risk factors to 53.4% in adults with five risk factors.

Figure 5.28 **Percentage of Adults Age 18 and Over Who Reported Limitations in Their Activity by Number of Cardiovascular Disease Risk Factors*, Utah, 2001, 2003, 2005**
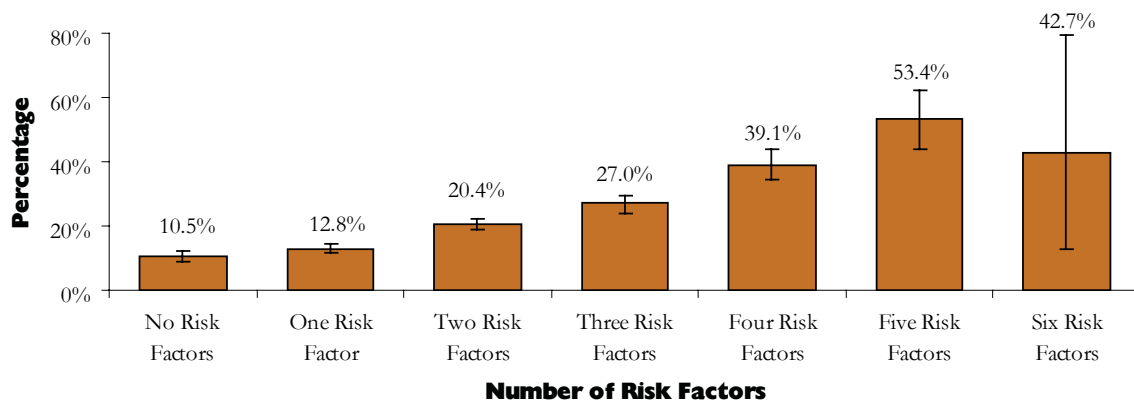
Source: Utah Behavioral Risk Factor Surveillance System, Office of Public Health Assessment, Utah Department of Health
* Risk factors include high blood pressure, high cholesterol, smoking, diabetes, inadequate physical activity, and being overweight or obese

Implications

Risk factor profiles in the population continue to worsen. Rates for doctor-diagnosed high blood pressure remain unchanged, as does the proportion of adults reporting regular physical activity. While those rates remain constant, the percentage of adults with high cholesterol, diabetes, or persons who are overweight or obese continue to rise. As the population of Utah ages, there will be a substantial increase in the incidence of cardiovascular events.

The disparities that exist between population subgroups is also cause for concern. Groups of low socioeconomic status and minority racial and ethnic populations such as Blacks, Native Americans and Hispanics continue to have a higher prevalence of risk factors for CVD. The Hispanic population is of particular concern. The rates of diabetes and obesity are high, and as the population ages the risk for cardiovascular events will increase.

There is room for improvement in Utah in addressing all risk factors related to CVD. There are several HP2010 goals that relate to the prevalence of CVD risk factors. Most of these goals remain to be accomplished. In order to successfully reduce cardiovascular mortality and morbidity, interventions should help people implement lifestyle changes that will reduce their CVD risk.

Table 5.29	Healthy People 2010 Objectives		
Number	**Objective Description**	**U.S. Target**	**Utah Target**
12-9	Reduce the proportion of adults with high blood pressure	14%	14%
12-14	Reduce the proportion of adults with high blood cholesterol levels	17%	17%
27-1a	Reduce cigarette smoking by adults	12%	11%
5-3	Reduce the overall rate of diabetes that is clinically diagnosed	2.5%	2.5%
22-2	Increase the proportion of adults who engage regularly, preferably daily, in moderate physical activity for at least 30 minutes per day	30%	65%
22-3	Increase the proportion of adults who engage in vigorous physical activity that promotes the development and maintenance of cardiorespiratory fitness 3 or more days per week for 20 or more minutes per occasion	30%	65%
19-2	Reduce the proportion of adults who are obese	15%	15%

Source: U.S. Department of Health and Human Services. Healthy People 2010. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington, DC: U.S. Government Printing Office, November 2000.

Conclusion

Despite the decline in mortality from cardiovascular disease, much work remains to be done to reduce future incidence of cardiovascular events. Cardiovascular disease remains the leading cause of death in Utah. A large portion of the mortality burden lies among those age 65 years and older. The burden of cardiovascular disease among men is striking, but women are not spared. Disability is high among those who report a history of cardiovascular disease, many of whom have not received rehabilitation.

This report identifies a number of important opportunities to improve cardiovascular health in Utah:
- Increased public knowledge is needed about the signs and symptoms of heart attack and stroke and the importance of calling 9-1-1 for suspected cardiovascular events.
- Except for smoking, the prevalence rates of important modifiable cardiovascular risk factors are stable or have increased in recent years.
- High cholesterol, diabetes and overweight/obesity rates have all increased.
- More than half the adult population reported two or more cardiovascular risk factors in recent surveys.
- As the population of Utah ages, the possibility of increasing cardiovascular disease threatens the state's overall national health ranking.
- Cardiovascular disease disparities among Utah's diverse ethnic groups are also of increasing concern.

As efforts are made to decrease the burden of cardiovascular disease in the state, more questions about the entire scope of the problem will need to be answered. While this report contains a number of measures that examine mortality, hospitalization, and risk factor prevalence, it lacks specific data on the incidence and prevalence of cardiovascular disease, total health care costs, survival rates, and disability associated with cardiovascular disease. Data on secondary prevention and the prevention of recurrent events are also lacking. Finally, the cardiovascular health of youth is not yet well understood, despite the growing understanding that the adult burden of cardiovascular disease will be affected by increasing obesity among youth. These data are necessary for interventions to be successful in addressing the true burden of cardiovascular disease in the state.

Collaborative efforts will be needed to address cardiovascular disease across the state. This report contains information about the success of important efforts to reduce mortality and morbidity from cardiovascular disease. Future collaborative efforts will need to be extended to all communities in Utah, and particularly to rural and frontier communities that face unique challenges. It is our hope that this report will be useful to a variety of partners as public health efforts to control cardiovascular disease expand.

Appendices

Appendix A: Classification of Diseases and Conditions

The International Classification of Diseases, Ninth and Tenth Revisions, Clinical Modification (ICD-9-CM and ICD-10 CM) were used to identify the specific disease categories in this report. The following ICD-9 or ICD-10 codes have been grouped together to determine rates for the specific conditions included in this report. The following codes were chosen to be consistent with chronic disease indicator recommendations.[32] Mortality data prior to 1999 were adjusted for comparability.[33]

Primary Diagnosis	ICD-9 Codes	ICD-10 Codes
Cardiovascular Disease	390-448	I00-I78
Heart Disease	390-398, 402, 404, 410-429	I00-I10, I11, I13, I20-I51
Coronary Heart Disease	402, 410-414, 429.2	I11, I20-I25
Myocardial Infarction	410	I21-I22
Heart Failure	428	I50
Stroke	430-438*	I60-I69

* Hospitilzation indicators for stroke excluded ICD-9 code 435 from analysis

Appendix B: Data Sources

Vital Records

Vital statistics certificates filed with the Utah State Office of Vital Records and Statistics are the primary source of data presented in the mortality tables. Centralized vital statistics registration was established in Utah in 1905. Those records include certificates of live birth, death and fetal death. The death certificate includes demographic information and the cause and circumstances of death and it is based on the national standard death certificate. The current certificate has been in use since 1989.

Hospital Discharge Database

The Hospital Discharge Database currently contains hospital inpatient data only. Fifty-five Utah hospitals have submitted data to the Utah Health Data Committee since 1992, including nine psychiatric facilities, seven specialty hospitals, and the Veterans Administration Medical Center. Shriners Hospital, a charity hospital, and the Utah State Hospital are exempt from reporting requirements. All hospitals report discharge data for each inpatient served. "Discharge data" means the consolidation of complete billing, medical, and personal information describing a patient, the services received, and charges billed for each inpatient hospital stay. The database includes demographic data (age, sex, residence, zip code), diagnoses recorded at discharge, total hospital charges, length of stay, and other information.

Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing surveillance program designed to estimate the prevalence of risk factors for the major causes of death and disability in the United States. Behavioral risk factor surveys have been conducted since the early 1980s to provide state-specific estimates of the proportion of adults aged 18 and older with health conditions and health risk behaviors. The program has grown to include 50 states and several U.S. territories. The BRFSS is conducted as a random digit telephone survey of the non-institutionalized adult population.

Utah's sample has grown in size from 612 respondents in 1984 to more than 5,000 respondents in 2005. After data collection is complete for the year, the individual responses are weighted to be representative of the state's adult population. The Utah BRFSS has proven to be an important tool for monitoring the health behaviors of Utah adults. It has been used to support risk reduction and disease prevention activities by directing program planning, assessing trends and targeting relevant population groups.

HEDIS

The Health Plan Employer Data and Information Set (HEDIS) is a set of standardized performance measures designed to ensure that purchasers and consumers have the information they need to reliably compare the performance of managed health care plans. The performance measures in HEDIS are related to many significant public health issues such as cancer, heart disease, smoking, asthma and diabetes. HEDIS also includes a standardized survey of consumers' experiences that evaluates plan performance in areas such as customer service, access to care and claims processing. HEDIS is sponsored, supported and maintained by the National Committee on Quality Assurance.

Get with the Guidelines

Get with the Guidelines (GWTG) is a hospital-based quality improvement program designed to close the treatment gap in cardiovascular disease. The program provides physicians and healthcare providers with materials, information, and tools based on the American Heart Association/American College of Cardiology Secondary Prevention Guidelines on cardiovascular disease. Utilizing discharge protocols in the hospital setting helps ensure that cardiovascular disease patients are placed on appropriate medications, informed of recommended behavioral modifications, and improve the rate of intervention with cardiovascular disease patients both in-hospital and post-discharge to reduce the incidence of cardiovascular events. A key component of this continuous quality improvement program is to monitor progress through the web-based Patient Management Tool.

The Patient Management Tool is an online, interactive assessment and reporting system that assists in the implementation of the GWTG program. It does this by providing patient-specific guidelines information and enabling each institution to track its adherence to the guidelines individually and against the American Heart Association's national benchmarks over time. This tool is an important part of implementing the GWTG program.

Appendix C: Methods

Age-Adjustment

Some of the rates presented in the report are age-adjusted, that is, they are stated in terms of an age-standardized value. Age-adjusted rates control for age effects, allowing better comparability of rates across areas and time. When comparing across geographic areas, such as comparing a state to the entire United States, or one state to another, age-adjusting controls for area-to-area differences in health events that can be explained by differences in the age distribution of the populations being compared.

For example, a state with an older population will have higher death rates for cancer even though its exposure levels and cancer rates for specific age groups are the same as those of other states. Utah has a young population, causing our crude death rates to be lower than the U.S. rates. By using age-standardized rates, Utah and U.S. rates may be meaningfully compared. Age-adjusting is also used to compare death rates across time, as the age distributions of populations vary over different time periods. Age-adjustment was performed using the year 2000 U.S. standard population published by the National Center for Health Statistics.[34]

The age categories used in age-adjusting varied dependent on the data and subgroup being analyzed. Mortality and hospital discharge data were analyzed using four age groups (0-54, 55-64, 65-74, 75+). BRFSS race/ethnicity data were analyzed using three age groups (18-34, 35-49, 50+), and all other BRFSS data were analyzed using eight age groups (18-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, 85+).

Confidence Intervals

The 95 percent confidence intervals expressed in this report indicate the range of values within which the statistic would fall 95 percent of the time if a researcher were to calculate the statistic (e.g., a percentage or rate) from an infinite number of samples of the same size drawn from the same base population. Traditionally, 95 percent confidence intervals are symmetric and centered at the estimated rate (calculated as 1.96 times the standard error). However, in the context of public health measures, it makes sense that confidence intervals be equal to or greater than zero, since the rates are non-negative values. Occasionally, when the proportion is close to zero or there are a small number of events, the lower interval is less than zero. Sometimes, when a proportion is near 100 percent, the upper bound is greater than 100 percent. For these cases, researchers used asymmetric distributions that constrain the lower and upper intervals to values that lie above zero or below 100 percent.

ICD-9 and ICD-10 Codes

The Ninth Revision of the International Classification of Diseases (ICD-9) was used to code the underlying cause of death in Utah for data years 1979 through 1998, and the Tenth Revision of the International Classification of Diseases was used to code the underlying cause of death in Utah for all deaths that occurred during or after 1999 and will be used in future years. The ICD-9 and ICD-10 codes which were grouped together to determine rates for the specific conditions included in this report are listed in Appendix A.

Population Count Estimates

Percentage estimates were applied to population counts to derive an estimate for the total number of persons in Utah to whom the behavior applies. For example, the survey estimate of the percentage of persons who smoked was applied to the total adult population of Utah to derive an estimate of the total number of smokers in Utah. The population estimates used in the BRFSS, mortality, and hospitalization data tables were prepared by the Utah Governor's Office of Planning and Budget. Population estimates for the mortality data tables by race and ethnicity were obtained from the U.S. Census.

Population Density

Population density was calculated at the county level by dividing the total mid-year population in 2003 for a given county by the total land area for the same county. The population density was six or fewer persons per square mile for frontier counties, greater than six but fewer than 100 persons per square mile for rural counties, and 100 or more persons per square mile for urban counties.

Appendix D: Glossary

Atherosclerosis - A type of hardening of the arteries in which cholesterol and other substances in the blood are deposited in the walls of arteries, including the coronary arteries that supply blood to the heart. In time, narrowing of the coronary arteries by atherosclerosis may reduce the flow of oxygen-rich blood to the heart.

Atrial fibrillation – A disorder where the heart's two small upper chambers (the atria) quiver instead of beating effectively. When this happens blood isn't pumped completely out of the atria, so the blood may pool and clot. If a piece of a blood clot in the atria leaves the heart and becomes lodged in an artery in the brain, a stroke results.

Arrhythmia - A disorder of the regular rhythmic beating of the heart. Arrhythmias can occur in a healthy heart and be of minimal consequence. They may also indicate a serious problem and lead to heart disease, stroke or sudden cardiac death.

Blood pressure - The force of the blood pushing against the walls of arteries. Blood pressure is measured as two numbers, the systolic pressure (the first number, which measures the pressure while the heart is contracting) and the diastolic pressure (the second number, which measures the pressure when the heart is resting between beats). Normal blood pressure is defined as less than 120/80 mmHg.

Body mass index (BMI) - A mathematical formula to assess body weight relative to height. The measure correlates highly with body fat. BMI is calculated as weight in kilograms divided by the square of the height in meters (kg/m^2). Because it is readily calculated, BMI is the measurement of choice as an indicator of healthy weight, overweight, and obesity. Normal weight is defined as a BMI of 18.5-24.9, overweight is defined as a BMI of 25-29.9, and obese is defined as a BMI of 30 or greater.

Cardiac event - An adverse heart related disease manifestation. These may include blood pressure changes, myocardial infarction (heart attack), thrombosis, arrhythmias, myocarditis, pericarditis, cardiomyopathy, ventricular failure, and heart failure.

Cardiovascular disease (CVD) - Includes a variety of diseases of the heart and blood vessels, coronary heart disease (coronary artery disease, ischemic heart disease), stroke (brain attack), high blood pressure (hypertension), rheumatic heart disease, congestive heart failure, and peripheral artery disease.

Cardiovascular event - An adverse event that involves a part of the circulatory system. These may include all cardiac events (see definition) as well as other peripheral events such as stroke.

Cholesterol - A waxy substance that circulates in the bloodstream. When the level of cholesterol in the blood is too high, some of the cholesterol is deposited in the walls of the blood vessels. Over time, these deposits can build up until they narrow the blood vessels, causing atherosclerosis, which reduces the blood flow. The higher the blood cholesterol level, the greater the risk of getting heart disease. Blood cholesterol levels of less than 200 mg/dl are considered desirable. Levels of 200-239 mg/dl are considered borderline high and levels of 240 mg/dl or above are considered high. High blood cholesterol levels require further testing and possible intervention. For those with high cholesterol, a total blood cholesterol measurement of 199 mg/dl or less is considered to be under control.

HDL (high-density lipoprotein) cholesterol - The so-called good cholesterol. Cholesterol travels in the blood combined with protein in packages called lipoproteins. HDL is thought to carry cholesterol away from other parts of the body back to the liver for removal from the body. A low level of HDL increases the risk for CHD, whereas a high HDL level helps protect against CHD. The recommendations for HDL depend on gender. The recommended HDL level for women is 50 mg/dL or greater and for men, 40 mg/dL or greater.

LDL (low-density lipoprotein) - The so-called "bad" cholesterol. LDL contains most of the cholesterol in the blood and carries it to the tissues and organs of the body, including the arteries. Cholesterol from LDL is the main source of damaging buildup and blockage in the arteries. The higher the level of LDL in the blood, the greater the risk for CHD. LDL cholesterol levels of less than 100 mg/dl are considered "optimal"; 100-129 mg/dl is considered "above optimal", levels of 130 -159 mg/dl are considered "borderline high" and above 160 mg/dl are considered "high".

Coronary artery bypass - A procedure used to reroute the blood supply around a blocked section of a coronary artery. Surgeons remove healthy blood vessels from another part of the body, such as the leg or chest wall. Then the surgeons surgically attach the vessels to the diseased artery in such a way that the blood can flow around the blocked section.

Coronary heart disease (CHD) - A condition in which the flow of blood to the heart muscle is reduced. Like any muscle, the heart needs a constant supply of oxygen and nutrients that are carried to it by the blood in the coronary arteries. When the coronary arteries become narrowed or clogged, they cannot supply enough blood to the heart. If insufficient oxygen-carrying blood reaches the heart, the heart may respond with pain called angina. The pain usually is felt in the chest or sometimes in the left arm or shoulder. When the blood supply is cut off completely, the result is a heart attack. The part of the heart muscle that does not receive oxygen begins to die, and some of the heart muscle is permanently damaged.

Diabetes - A condition in which the body doesn't produce the right amount of insulin, or is unable to use the insulin it has. Insulin is the hormone that allows cells to absorb glucose (sugar) from the bloodstream. Some people with diabetes must inject themselves with insulin every day to maintain a healthy glucose level. Others are able to control the condition with pills, diet and exercise.

Type 1 diabetes (previously called insulin-dependent diabetes mellitus or juvenile-onset diabetes) represents about five percent of all persons with diagnosed diabetes. Its clinical onset is typically under age 30 years. Most often this type of diabetes is a result of an autoimmune destructive disease in beta (insulin-producing) cells of the pancreas in genetically susceptible individuals. Insulin therapy is always required to sustain life and maintain blood glucose control.

Type 2 diabetes (previously called non-insulin-dependent diabetes mellitus or adult-onset diabetes) is the most common form of diabetes in the U.S. and the world, especially in certain racial and ethnic groups and in elderly persons. In the U.S., approximately 95 percent of persons with diagnosed diabetes (10.5 million) and almost 100 percent of all persons with undiagnosed (5.5 million) diabetes probably have type 2 diabetes.

Direct costs - Costs associated with an illness that can be attributed to a medical service, procedure, medication, etc. Examples include payment for an x-ray; pharmaceutical drugs, for example, insulin; surgery; or a physician visit.

Disability - The general term used to represent the interactions between individuals with a health condition and barriers in their environment. The term disability is operationalized as self-reported activity limitations or use of assistive devices or equipment related to an activity limitation.

EMS - The Emergency Medical Service system (EMS) provides pre-hospital care to patients in need of urgent medical care, and rapid transportation to an emergency department. EMS providers work under the authority and indirect supervision of a medical director or board-certified physician who oversees the policies and protocols of a particular EMS system or organization.

Healthy People 2010 (HP2010) – A comprehensive, nationwide health promotion and disease prevention agenda, coordinated by the U.S. Department of Health and Human Services. The HP2010 goals and objectives for improving health were created by a broad coalition of experts from many sectors. The two overarching goals of HP2010 are to increase the quality and years of healthy life and to eliminate health disparities.

Heart attack - Also called acute myocardial infarction, occurs when a coronary artery becomes completely blocked, usually by a blood clot (thrombus), resulting in lack of blood flow to the heart muscle and therefore loss of needed oxygen. As a result, part of the heart muscle dies (infarcts). The blood clot usually forms over the site of a cholesterol rich narrowing (or plaque) that has burst or ruptured.

Heart disease - The leading cause of death and a common cause of illness and disability in the United States. Coronary heart disease and ischemic heart disease are specific names for the principal form of heart disease, which is the result of atherosclerosis, or the buildup of cholesterol deposits in the coronary arteries that feed the heart.

Heart failure - A condition in which the heart cannot pump enough blood to meet the needs of the body's other organs. Heart failure can result from narrowed arteries that supply blood to the heart muscle and from other factors. As the flow of blood out of the heart slows, blood returning to the heart through the veins backs up, causing congestion in the tissues. Often swelling (edema) results, most commonly in the legs and ankles. Sometimes fluid collects in the lungs and interferes with breathing, causing shortness of breath, especially when a person is lying down.

High blood pressure (hypertension) - A systolic blood pressure of 140 mmHg or greater or a diastolic pressure of 90 mmHg or greater. With high blood pressure the heart has to work harder, resulting in an increased risk of a heart attack, stroke, heart failure, kidney and eye problems, and peripheral vascular disease. For those who have high blood pressure, they are considered to be under control if their blood pressure is less than 140/90 mmHg, or less than 130/80 mmHg for those with diabetes.

Hospital discharges - The number of inpatients discharged from short-stay hospitals where some type of disease was the first listed diagnosis. Discharges include people both living and dead.

Incidence - The number of new cases of disease that develops in a population during a specified period of time, such as a year.

Indirect costs - Those costs associated with an illness that occur because an individual cannot work at his or her usual job due to premature death, sickness, or disability (for example, amputation).

Ischemic heart disease - Includes heart attack and related heart problems caused by narrowing of the coronary arteries and therefore a decreased supply of blood and oxygen to the heart. Also called coronary artery disease and coronary heart disease.

JCAHO - The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) is a nonprofit organization committed to improving healthcare nationwide. Accreditation from this organization is widely respected as a mark of quality healthcare. In 2003, three Utah hospitals (LDS Hospital, University of Utah Hospital, and Utah Valley Regional Medical Center) became JCAHO certified stroke centers.

Morbidity – A measure used to address the prevalence or incidence of a disease, the degree or severity of a disease, disability or the state of being of someone with a disease.

Mortality - The total number of deaths from a given disease in a population during a specific interval of time, usually a year.

Myocardial infarction – (see heart attack)

Obesity - a BMI of 30.0 kg/m^2 or greater.

Overweight – a BMI of greater than 25 kg/m^2 but less than 30.0 kg/m^2.

Prevalence - The total number of cases of disease existing in a population at a specific point in time.

Rate – The basic measure of disease occurrence that expresses probability or risk of disease in a defined population over a specified period of time.

Recommended amount of physical activity - Every American adult should participate in 30 minutes or more of moderate intensity activity on most, and preferably all, days of the week.[35] A person is considered to be meeting the recommendation if they participate in at least 30 minutes of moderate activity at least five days a week, or if they participate in 20 minutes of vigorous activity at least three days a week. Moderate physical activity includes things such as brisk walking, swimming, dancing, gardening, and yardwork. Vigorous activity includes things such as jogging/running, lap swimming, cycling, aerobic dancing, skating, rowing, jumping rope, cross-country skiing, hiking/backpacking, racquet sports, and competitive group sports.

Risk factor - a variable associated with an increased risk of disease or infection. Risk factors are not necessarily causal.

Stent - A wire mesh tube used to prop open an artery during angioplasty. The stent is collapsed to a small diameter and put over a balloon catheter. It's then moved into the area of the blockage. When the balloon is inflated, the stent expands, locks in place and forms a scaffold. This holds the artery open. The stent stays in the artery permanently, holds it open, improves blood flow to the heart muscle and relieves symptoms (usually chest pain).

Stroke - A form of cerebrovascular disease that affects the arteries of the central nervous system. A stroke occurs when blood vessels bringing oxygen and nutrients to the brain burst (hemorrhagic stroke) or become clogged by a blood clot or some other particle (ischemic stroke). Because of this rupture or blockage, part of the brain does not get the flow of blood it needs. Deprived of oxygen, nerve cells in the affected area of the brain cannot function and die within minutes. When nerve cells cannot function, the part of the body controlled by these cells cannot function either.

Transient ischemic attack (TIA) - Also called a "mini-stroke," occurs when a blood clot temporarily clogs an artery, and part of the brain doesn't get the blood it needs. The symptoms occur rapidly and last a relatively short period of time. Most TIAs last less than five minutes. The average is about a minute. Unlike stroke, when a TIA is over, there's no injury to the brain.
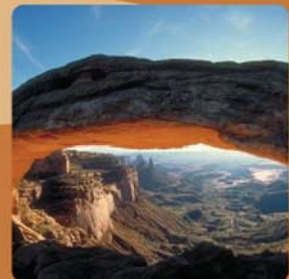
Tissue plasminogen activator (tPA) - An agent used to dissolve clots in ischemic stroke patients. To be effective, tPA must be administered within the first three hours following symptom onset.

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